

**FINANCIAL INSTRUMENT FILTERING SYSTEM AND METHOD THEREFOR****FIELD OF INVENTION**

5        This invention relates to a system, memory media and a  
method for searching through a universe of information  
related to financial instruments. The information includes  
data pertaining to stocks, bonds, mutual funds, options,  
10       futures, insurance or other financial products. In  
particular, the invention facilitates rapid, systematic  
selection of filter conditions, and a corresponding sequence  
of one or more filter passes through the universe to narrow  
the items of interest to a manageable number. The system  
according to the present invention includes a computer with  
15       a program which, among other things, prompts the user  
graphically to aid in the selection of filter pass criteria.

**BACKGROUND OF INVENTION**

20       Investment selection has become increasingly complex  
due to ever larger numbers of security type financial  
instruments on the one hand and an expanding number of  
investment parameters or data fields that are offered by  
information sellers, especially electronic information  
25       sellers, on the other hand. For example, more than 100 data  
categories for each of 9,000 mutual funds are tracked by the  
Morningstar Principia software product available from  
Morningstar, Inc. Another service, the Value Line Mutual  
Fund Survey, available from Value Line, Inc., covers more  
30       than 150 data categories for more than 8,200 mutual funds.

Using such software systems to select a manageable  
number of funds for detailed analysis making a sequence of  
filter passes to reduce the size of the universe until that  
35       manageable number is reached. The process is inherently  
difficult because the spread sheets are so large. The user

must first scroll horizontally to identify those data fields of interest, with considerable risk of confusion and error. Then filter criteria have to be specified by what amounts to cut and try methods since the data fields are much too long to indicate to the naked eye the range and distribution of values therein. Also, in these products, the user must change display screens, leaving the spreadsheet screen in favor of a filter criteria screen. When the spread sheet reappears after a filter pass, the filter conditions are not displayed. To maintain orientation the user is forced to an awkward process of switching back and forth between the spreadsheet screen and filter criteria screen.

These products are not easy to use. Using them well requires much training and skill. Even then the procedures are likely to be time-consuming for most operators. What is needed is a system that is easy to access for the rapid selection of filter conditions.

The present invention provides such a system. It presents investment parameters and parameter limiters in a manner that allows a user to rapidly establish a filter condition for a filter pass through the data.

The present invention also provides a method of conducting a search of a universe of financial instruments by visually presenting a population graphic showing the population of the financial instruments in different distribution categories as an aid for filter condition selection

#### **SUMMARY OF INVENTION**

The present invention involves an user interactive apparatus that conducts a search of a universe of financial instruments. The search includes the performance of n

filter passes of the universe of financial instruments. Each filter pass is based on at least one of a plurality of investment criteria.

5       The apparatus includes a computer system that includes a processor, a memory, an access means, a viewing screen, a computer input means and a security search means. The security search means configures the computer system to perform the filter passes according to user designated  
10   filtering. Prior to an ith filter pass, the plurality of filter criteria are presented on the viewing screen, where i is an integer from 1 to n. User selection by operation of the computer input means of at least one of the filter investment criteria establishes a proposed filter condition  
15   for the ith filter pass. A population distribution graphic for the selected proposed filter condition is presented on the viewing screen. The population distribution graphic shows the population of financial instruments in different frequency of occurrence categories for the selected proposed  
20   filter condition. By visual inspection of the graphic, the user can rapidly select one or more of the filter investment criteria for the next or ith filter pass. In preferred embodiments, the population distribution graphic is a histogram.

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      The security search means also enables the simultaneous presentation on the viewing screen of the population distribution graphic and the plurality of filter investment criteria from which the user may compose a filter condition.  
30   In a preferred embodiment, the viewing screen is split into a first display area and a second display area. The plurality of filter investment criteria is displayed in the first area. The histogram is displayed in the second area. The filter investment criteria are selectable by user  
35   operation of the computer input means to select a proposed filter condition. The security search means responds to a

user selected proposed filter condition to display a histogram therefor. This permits the user to quickly ascertain whether the proposed filter condition is a desired one.

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In one embodiment, the user can select a limiter from a plurality of limiters presented on the viewing screen to limit an investment parameter. In an alternate embodiment a shortcut selection technique comprises selection of a limiter actuator presented on the viewing screen in association with one or more of the display elements of the histogram. The limiter actuator is assigned the limiter that the use is expected to choose for the selected investment parameter.

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The method according to the present invention conducts a search of a universe of financial instruments that includes the performance of n filter passes of the universe with a computer system having a processor, a memory, an access means, a viewing screen and a computer input means. Each filter pass has a filter condition that is selected from a plurality of filter investment criteria for the financial instruments. The method comprises:

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configuring the processor, the memory, the access means, the viewing screen and the computer input means to conduct the search;

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presenting on the viewing screen the plurality of filter investment parameters, the parameters being selectable by user operation of the computer input means;

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presenting on the viewing screen a histogram showing the population of the financial instruments in different frequency categories for a proposed filter



condition of an  $i^{\text{th}}$  one of the filter passes, where  $i$  is an integer from 1 to  $n$ ;

5       executing said  $i^{\text{th}}$  filter pass in response to a run command generated by user operation of the computer input means; and

10       repeating the foregoing operations until the  $n^{\text{th}}$  filter pass has been performed.

A memory media according to the present invention comprises:

15       (a) means for configuring the computer system into a filter means for performing the filter passes;

20       (b) means for controlling the filter means to present on the viewing screen a plurality of filter investment that are selectable by user operation of the computer input means;

25       (c) means for controlling the filter means to present on the viewing screen a histogram showing the population of the financial instruments in different frequency of occurrence categories for a proposed filter condition of an  $i^{\text{th}}$  one of the filter passes;

30       (d) means for controlling the filter means to execute the proposed or  $i^{\text{th}}$  filter pass in response to a run command generated by user operation of the computer input means;

35       (e) means for causing means (b), means (c) and means (d) to repeat until the  $n^{\text{th}}$  filter pass has been performed; and

(e) optional means for combining the n filter passes with an investment category filter.

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**BRIEF DESCRIPTION OF DRAWINGS**

Other and further objects, advantages and features of the present invention will be understood by reference to the following specification in conjunction with the accompanying  
10 drawings, in which like reference characters denote like elements of structure and:

FIG. 1 is a block diagram of an investment decision maker system according to the present invention;  
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FIG. 2 is a viewing screen layout of a split screen display for a universe of financial instruments prior to filtering;

20 FIG. 3 is a viewing screen layout of a split screen display for user selection of PreScreen filter parameters for a first filter pass;

FIG. 4 is a histogram for one investment parameter  
25 after the first filter pass;

FIG. 5 is a viewing screen layout of a split screen display for user selection of filter parameters for a second filter pass with a histogram for one selected investment  
30 parameter;

FIG. 6 is a viewing screen layout of a split screen display for user selection of filter parameters for a third filter pass with a histogram for one selected investment  
35 parameter;

FIGS. 7 and 8 are histograms for other investment parameters selected for a third filter pass;

5 FIG. 9 is a viewing screen layout of a split screen display for user selection of filter parameters for a fourth filter pass with a histogram for one selected investment parameter;

10 FIGS. 10 through 13 are histograms for other investment parameters selected for the fourth filter pass;

15 FIG. 14 is a viewing screen layout of a split screen display for user selection of filter parameters for a fifth filter pass with a histogram for one selected investment parameter;

FIGS. 15 through 20 are histograms of other investment parameters selected for the fifth filter pass;

20 FIG. 21 is a flow diagram of the investment selection program of the FIG. 1 system;

25 FIG. 22 is a flow diagram of the PreScreen filter of FIG. 21;

FIG. 23 is a flow diagram of the FundName feature of the FIG. 21 program;

30 FIG. 24 is a viewing screen layout of a split screen display for an alternative embodiment for user selection of a parameter limiter for a selected investment parameter;

35 FIG. 25 is a viewing screen layout of a split screen display for an alternative embodiment for user selection of a parameter limiter for another selected investment parameter; and

FIG. 26 is a viewing screen layout of a split screen display for an alternative embodiment for user selection of a parameter limiter for still another selected investment parameter.

### DESCRIPTION OF PREFERRED EMBODIMENTS

The system and method of the present invention can be used for selection of a variety of financial instruments, such as stocks, bonds, mutual funds, options, futures, insurance and other financial products. By way of example, a preferred embodiment of the invention will be described herein for mutual fund applications.

With reference to FIG. 1, there is provided a system 40 for selecting a manageable number of financial instruments from a universe of such instruments. System 40 is a computer system that includes a computer 41, a display 47, a computer input means 48 and a printer 49. Computer 41 includes a memory 42, a processor 43 and an access means 43. Memory 42 includes a data portion 42A and a control portion that includes a security search means 42B.

Access means 44 is operable to fetch program or control instructions from memory 42, to fetch data from memory data portion 42A for processor 43 and to perform operations on the data as directed by the program instructions.

Security search means 42B is operable to configure computer system 41 into a filtering means for performing filter passes of a mutual fund data base. The filter means operates on the mutual fund data base that can be accessed by access means 44 locally from memory data portion 42A or remotely via a communication medium (for example, the public telephone network, the internet, or other communication

facility) from a mutual fund data base 45 or other data bases 46. Access means 44 also includes a communications facility (not shown) to enable communication with data bases 45 and/or 46.

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The fund data is generally compiled and provided by a vendor either on CD ROM or via an on line service (not shown). The fund data includes a universe of funds and investment parameters for each fund. For example, a current data base available from Morningstar, Inc. provides data for about 100 investment parameters for each of more than 9,000 funds.

Memory 42 includes any type of state of the art memory, as, for example, RAM, EPROM, magnetic tape or disk storage devices, optical storage devices, and the like and includes memory drives for such devices. In some preferred embodiments, memory data portion 42A includes a CD ROM that contains the data base for the universe of mutual funds. Security search means 42B may be resident in memory 42 or be contained on a CD-ROM, a magnetic disk or other portable memory media that can be inserted into a memory drive of memory 42.

Security search means 42B enables a user to select a manageable number of funds from the universe on an interactive basis. Security search means 42B enables the presentation of fund data via display 47 to the user for interactive selection by operation of computer input devices 48. Computer input devices 48 suitably include a keyboard and/or a point and click mouse or other cursor positioning and selection devices.

In accordance with the present invention, the fund data is presented to the user in a format that is easy to view, easy to use and easy to make quick selection of filter

conditions for a fund search. This format is shown in FIG. 2 as using a viewing screen 50 of display 47 having first and second display areas 51 and 52 arranged in a split screen. Display area 51 contains control data for user selection in the fund search process. Display area 52 is generally used to display data about the financial instruments in either tabular or chart form. A significant feature of the present invention is to present in display area 52 a population distribution or histogram frequency of occurrence chart based on user selected control data. However, display area 52 may also contain some control data for selection purposes.

The control data in display area 51 include a plurality of filter criteria from which the user may select to form a filter condition. The filter criteria include a plurality of investment parameters 53, a plurality of parameter limiters 54 and criteria boxes 55. Investment parameters 53 are limited to a relatively small number selected from the entire set of investment parameters available from the fund data vendor. In the illustrated embodiment, 19 investment parameters are used and comprise the following:

- 1 Year (Yr) Total Return - percent per annum (% p. a.)
- 3 Yr Total Return - % p. a.
- 5 Yr Total Return - % p. a.
- 10 Yr Total Return - % p. a.
- 15 Yr Total Return - % p. a.
- Annual Yield - %
- Volatility vs. Standard and Poor (S&P) 500
- Morningstar (Mstar) Rating - stars
- Front Load - %
- Deferred Load - %
- Expenses - %
- Maximum (Max) 12b-1 Fee - %
- Portfolio Turnover - %

Fund size - \$Mil

Manager Tenure - Yrs

Minimum (Min) Purchase - \$

Minimum Investment Retirement Account (Min IRA) - \$

5 Cash Position - %

Return-to-Risk Ratio

10 It is also understood that the number and choice of investment parameters is a matter of design choice and can vary from the number of and the specific parameters listed above. However, the number of parameters is preferably limited to a manageable number for display purposes as well as for ease of use.

15 Parameter limiters 54 comprise a set of mathematical operators as follows:

>	greater than
<	less than
=	equals
<=	equal to or less than
>=	equal to or greater than
<>	not equal to

20 It is understood that the number and choice of parameter limiters is a matter of design choice and can vary from the number of and the specific ones listed above.

25 There is one criteria box 55 for each investment parameter 53. The user can select one or more of investment parameters 53 by operation of computer input devices 48 (FIG. 1). For the illustrated example, the mouse is used to position the cursor over the 5 Yr Total Return investment parameter and clicked. This will highlight the 5 Yr Total Return investment parameter and its associated criteria box 30 55.

According to the present invention, a histogram chart 56 showing population or frequency of occurrence distribution for a selected or highlighted investment parameter is displayed in second area 52 of the viewing screen. Histogram 56 has the number of funds along its ordinate and a plurality of frequency of occurrence categories along its abscissa. There are five illustrated categories, but there could be more or less. These categories are a matter of choice and design. For the illustrated embodiment, these categories are: < 12%, 12% to 15%, 15% to 18%, 18% to 21%, and > 21%.

Thus, a user can view a histogram 56 for each parameter that is selected. This is a powerful aid to the user in the selection of investment parameters 53 and criteria 54 to establish filter conditions. Thus, by selecting only those funds with a greater than 18% total return for a five year period, the number of funds can be limited to 625 (the sum of the two right hand bars). This is quickly done by operating the input devices to insert ">18%" in the criteria box 55 adjacent the 5 Yr Total Return investment parameter.

First display area 51 also includes some control buttons or switches shown as a Run Screen button 57, PreScreen button 58, FundName button 59, a Run FundCompare button 60, a Table button 61 and a LINKS button 62. These buttons are user operable for controlling operation of security search means 42B as described hereinafter.

A fund search typically comprises a sequence of  $n$  filter passes through the fund universe to provide  $n$  progressively smaller numbers or sets of funds until a manageable number of funds is presented to the user for analysis, investment or other purpose.



Each filter pass has a filter condition that is selected from the plurality of parameter limiters 54 and the plurality of investment parameters 53.

5       The method of searching a universe of funds according to the present invention is as follows:

10       (a) Configuring the processor 43, the memory 42, the access means 44, the viewing screen 50 and the computer input devices 48 to conduct the search.

15       (b) Presenting on viewing screen 50 of display 47 the investment parameters 53 and the parameter limiters 54. This allows the user to view all of the filter criteria at a glance so as to enable quick selection for forming a filter condition.

20       (c) Presenting on viewing screen 50 a histogram showing the population of the funds in different frequency of occurrence categories for a proposed filter condition of the  $i^{\text{th}}$  one of the filter passes. The proposed filter condition includes all filter conditions for previously performed filter passes as well as proposed new criteria for the  $i^{\text{th}}$  pass. This gives the user a powerful aid for filter condition selection as it can be seen at a glance what the fund distribution is across the frequency of occurrence categories. In preferred embodiments, the plurality of investment parameters and parameter limiters and histogram are presented simultaneously on the viewing screen in display areas 52 and 52.

30       (d) Executing the proposed or  $i^{\text{th}}$  filter pass in response to a run command generated by user operation of the input means. The run command is generated by

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the security search means 42B in response to user operation of the Run Screen button 57 in FIG. 2.

5 (e) Repeating steps (a), (b) and (c) until the  $n^{\text{th}}$  filter pass has been performed.

(f) Optionally the  $n$  filter passes can be combined with the PreScreen investment category filter that is described below.

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The invention will be best understood by considering a typical fund search that will be described with reference to FIGS. 2 through 20 for a sequence of  $n=5$  filter passes.

15 For the illustrated viewing screens, there are 3,836 funds in the fund universe as shown at 63 in display area 51. With computer input devices 48, the user selects the PreScreen button 58. This causes security search means 42B to display in display area 52 a plurality of fund categories  
20 as shown at 64 in FIG. 3. This allows filtering by fund category. The user operates computer input devices 48 to select the Aggressive Growth and Growth fund categories. This will yield 1,387 funds as shown at 65 in display area 52. The user then initiates execution of the first filter  
25 pass by operating computer input devices 48 to select the Run Screen button 57.

Security search means 42B then causes processor 43, memory 42, access means 44, computer input devices 48 and  
30 viewing screen 50 configured as a filter means to execute the first filter pass. This will revise each of the histograms based on the set of funds remaining after the first filter pass. To select the conditions for the second filter pass, the user by operation of computer input devices  
35 48 can select one or more investment parameters 53 to view a new histogram for that parameter. FIG. 4 shows the

histogram for 5 Yr Total Return in display area 52. This histogram enables the user to see at a glance the population categories in which the Aggressive Growth and Growth funds are distributed so as to quickly make a choice of parameter limiters for the next filter pass.

The user, seeking high growth, selects those funds returning greater than 18% total return for five years. This is illustrated in FIG. 5 where the parameter limiter "> 18%" is inserted into the box adjacent the 5 Yr Total Return investment parameter. This will yield a set of 274 funds after the second filter pass. The user then initiates execution of the second filter pass by operating computer input devices 48 to select Run Screen button 57.

Security search means 42B then causes processor 43, memory 42, access means 44, computer input devices 48 and viewing screen 50 configured as a filter means to execute the second filter pass. This will revise each of the histograms based on the set of funds remaining after the second filter pass. To select the conditions for the third filter pass, the user by operation of computer input devices 48 can select one or more investment parameters 53 to view a new histogram for that parameter. FIG. 6 shows the histograms for 5 Yr Total Return in display area 52. FIGS. 7 and 8 show histograms for the Morningstar ratings and Front Load percentages.

The user, deciding to limit risk and cost somewhat, selects a Morningstar rating of 4 or more and a Front Load cost of zero. These criteria selections are entered in the criteria boxes 55 by user operation of computer input devices 48 as shown in display area 51 of FIG. 6. These filter conditions will yield a set of 93 funds after filtering. The user then initiates execution of the third

filter pass by operating computer input devices 48 to select Run Screen button 57.

Security search means 42B then causes processor 43,  
5 memory 42, access means 44, computer input devices 48 and  
viewing screen 50 configured as a filter means to execute  
the third filter pass. This will revise each of the  
histograms based on the set of funds remaining after the  
third filter pass. To select the conditions for the fourth  
10 filter pass, the user by operation of computer input devices  
48 can select one or more investment parameters 53 to view a  
new histogram for that parameter. FIG. 9 shows the  
histograms for the 5 Yr Total Return investment parameter in  
display area 52. FIGS. 10 through 13 show histograms for  
15 the Morningstar ratings, Front Load percentages, Range of  
Operating Expense and Range of Portfolio Turnover investment  
parameters.

The user, deciding to limit cost further and to limit  
20 taxes, selects a fund operating expense equal to or less  
than 0.9% and a Portfolio turnover equal to or less than  
75%. These criteria selections are entered in the criteria  
boxes 55 by user operation of computer input devices 48 as  
shown in display area 51 of FIG. 9. These filter conditions  
25 will yield a set of 22 funds after filtering. The user then  
initiates execution of the fourth filter pass by operating  
computer input devices 48 to select Run Screen button 57.

Security search means 42B then causes processor 43,  
30 memory 42, access means 44, computer input devices 48 and  
viewing screen 50 configured as a filter means to execute  
the fourth filter pass. This will revise each of the  
histograms based on the set of funds remaining after the  
fourth filter pass. To select the conditions for the fifth  
35 filter pass, the user by operation of computer input devices  
48 can select one or more investment parameters 53 to view a

new histogram for that parameter. FIG. 14 shows the histograms for the 5 Yr Total Return investment parameter in display area 52. FIGS. 15 through 20 show histograms for the Morningstar ratings, Front Load percentages, Range of Operating Expense, Range of Portfolio Turnover, Range of Manager Turnover and Minimum Purchase investment parameters.

The user, deciding in favor of fund management experience and moderate minimum purchases, selects fund manager tenure of greater than 3 years and a minimum purchase equal to or less than \$10,000. These criteria selections are entered in the criteria boxes 55 by user operation of computer input devices 48 as shown in display area 51 of FIG. 20. These filter conditions will yield a set of 12 funds after filtering. The user then initiates execution of the fifth filter pass by operating computer input devices 48 to select Run Screen button 57.

The user by operating the computer input devices 48 can now select the Table button 61 (FIG. 2) to display the investment parameter data for each of the 12 funds. If desired, the user can have the tabular data printed via printer 49 of FIG. 1.

The foregoing fund search leaves the user with a manageable number of 12 funds. With practice, the user will learn to combine filter passes so as to use multiple investment parameters and criteria to limit early round filter passes.

The security search means 42B can be designed to run in any suitable application platform such as a spread sheet, data base and the like. In a preferred embodiment, security search means 42B is designed to run in the EXCEL spread sheet application, available from Microsoft Corporation of Redmond, Washington.

In the user interactive apparatus described so far, to assign a parameter limiter to a selected investment parameter, the user must select one of the parameter  
5 limiters 54, optionally select an associated number and insert these selections into the criteria box 55 associated with the selected investment parameter. For example, FIG. 5 shows the user has selected ">15" as a parameter limiter and inserted it into the box 55 for the 5 YR Total Return  
10 investment parameter.

In FIGS. 24 through 26 there is shown a short cut technique for user selection of a parameter limiter for a  
15 selected investment parameter.

FIG. 24 shows in display area 52 for investment parameter 5 YR Total Return a histogram 56 that has a plurality of frequency of occurrence category display elements shown as bars 156, 157, 158, 159 and 160.  
20 Associated with bars 157, 158, 159 and 160 are a plurality of limiter actuators 167, 168, 169 and 170, respectively. Assigned to each limiter actuator 167 through 170 is a parameter limiter, greater than, as illustrated by the symbol ">" shown in each of the limiter actuator boxes 167  
25 through 170. This assignment is made as a matter of design choice based on the limiter that the user is expected to make for the selected investment parameter.

Each limiter actuator 167 through 170 is disposed on  
30 viewing screen 50 in proximity to a number associated with the corresponding display element. Thus, of the two numbers in the phrase. "15% to 18%", for display element 158, limiter actuator 168 is in proximity to the nearest of the two numbers, 15. To select ">15" as a parameter limiter for  
35 the 5 YR Total Return investment parameter, the user operates computer input devices 48 to select limiter

actuator 168 which automatically inserts ">15" in the box 55 associated with the 5 YR Total Return investment parameter as shown in FIG. 24.

5        FIG. 25 shows a viewing screen upon which is presented histogram 56 for the Volatility vs. S&P 500 investment parameter. Histogram 56 has display elements 156 through 161. Limiter actuators 167 through 171 are presented in association with display elements 157 through 161, respectively. As shown in FIG. 25, the parameter limiter, "<=" is assigned to each of limiter actuators 167 through 171. To select "<=0.75" as a parameter limiter for the Volatility vs. S&P 500 investment parameter, the user operates computer input devices 48 to select limiter actuator 168 which automatically inserts "<=0.75" in the box 55 associated with the Volatility vs. S&P 500 investment parameter as shown in FIG. 25.

20        FIG. 26 shows a viewing screen upon which is presented histogram 56 for the Front End Loads investment parameter. Histogram 56 has display elements 156 through 159. Limiter actuators 167 through 169 are presented in association with display elements 157 through 159, respectively. As shown in FIG. 26, the parameter limiter, "=" is assigned to limiter actuator 167 and the parameter element "<=" is assigned to each of limiter actuators 168 and 169. To select "<=4" as a parameter limiter for the Front End Loads investment parameter, the user operates computer input devices 48 to select limiter actuator 168 which automatically inserts "<=4" in the box 55 associated with the Front End Loads investment parameter as shown in FIG. 26.

35        Security search means 42B is shown in FIGS. 21 through 23 as having a Fundscreen portion 70, a PreScreen portion 100, a FundName portion 120 and a FundCompare portion 130.

Fundscreen portion 70 is initiated by user selection of security search means 42B from a menu of applications stored in computer 41. When so selected, Fundscreen is entered via a start box 71. Control passes to initializing box 72 which  
5 serves to initialize the hardware and software of computer 41 for configuring processor 43, memory 42, access means 44, display 47, and computer input devices 48 as a filter means. This will enable the presentation on viewing screen 50 in FIG. 2 of the split screen with the control data in display  
10 area 51.

After initialization, Fundscreen 70 enters a PreScreen status box 73. In the preferred embodiment, PreScreen 100  
15 is an optional feature that may or may not be used by the user. PreScreen status is a PreScreen filter condition that is either a default filter condition or the filter condition used for the last performed filter process. If such filter condition is acceptable, the status is okay.

20 If PreScreen status is not okay (user desires a different PreScreen filter condition), the user can select PreScreen button 58 of FIG. 2. Control passes to PreScreen box 100. Referring to FIGS. 3 and 22, PreScreen 100 is entered via start box 101 to PreScreen enabled box 102. At  
25 this point, the PreScreen fund category data is displayed on display area 52 of viewing screen 50. PreScreen 100 now awaits user selection of a deactivate button 66, investment categories or fund families.

30 If the user decides at this point not to use the PreScreen filter option, deactivate button 66 is selected by operation of computer input devices 48. PreScreen 100 then will deactivate and return control to Fundscreen 70.

35 On the other hand if a PreScreen filter operation is to be used, the user selects one or more fund categories and/or



a fund family at box 103. ~~Control then passes to another PreScreen disabled box 104. This allows the user to abort the PreScreen option at any time by operating deactivate button 66. Such activation will cause control to return to~~  
5 ~~Fundscreen. On the other hand,~~ To enter fund category and/or fund family data, an activate button 67 is operated. This causes execution of the PreScreen filter operation with control then being returned to Fundscreen.

10 Referring again to FIG. 21, control is returned from PreScreen to box 73. Assuming user satisfaction with the PreScreen status, control will pass to box 74. At this point, the user can form a proposed filter condition for the next filter pass by selecting an investment parameter 53.  
15 The user may now choose to view background information as at boxes 75A and 75B. This is accomplished at Box 75B by operation of the Table button 61 (FIG. 2). This will cause the spreadsheet of investment parameters to be displayed for all funds remaining in the search.

20 Control then passes to Box 76. The user can now select a parameter limiter to limit the investment parameter. The limiter will be displayed in criteria boxes 55 of display area 51. For example, In FIG. 5 limiter ">18", is displayed  
25 in criteria box 55 for investment parameter 5 Yr Total Return. When a proposed filter condition is acceptable, the user operates the Run Screen button 57 (FIG. 2). This executes the filter pass. This results in new charts being generated for each investment parameter based on all filter  
30 passes performed so far in the filtering sequence.

Control then passes to box 77 for decision as to the need for any more investment parameters for this filter pass. If yes, control is returned to box 74 for selection  
35 of another investment parameter under the control of boxes 74 through 77. If no, control passes to box 78 which

executes the filter pass when the user operates the Run Screen button 57.

Control passes to box 79 for a decision as to whether the filtered fund set is to be compared with a control group of funds that can be user selected by fund name.

If the user does not want to use the control group features of FundName 120 or FundCompare 130, control passes to box 81. Box 81 is a decision operation that allows the user to make a final determination whether the fund search results are satisfactory. If no, control is returned to box 73 for another filter pass. FIGS. 6 through 20 show charts for selected multiple investment parameters 53 and parameter limiters 54. If yes, control passes to decision box 82.

At decision box 82, the user needs to decide if additional information is desired from other resources. If no, the fund search is over as signified by end box 83. If yes, control is passed via a Links feature 84 that permits linkage to other data bases 46 (FIG. 1).

If the user chooses to use the control group feature at box 79, To FundName button 59 (FIG. 2) is activated. Control passes to box 80 for a user decision as to whether to revise the control group. The control group is a group of funds selected by the user for comparison with the filtered set of funds provided by the fund search. The control group is displayed to the user. If the control group is satisfactory, control passes to FundCompare 130.

If it is desired to alter the control group, control passes to FundName 120. Referring to FIG. 23, FundName is entered at start box 121 from either Fundscreen 70 or FundCompare 130. Control passes to box 122 for a decision as to whether the current control group is okay. If so

control is passed to FundCompare 130. If not, control passes to boxes 123 through 127 for changing the control group by adding or deleting funds.

5       At box 123, if the user wants to add a fund, control passes to box 124 where the user is enabled to add a fund by using computer input devices 48 to select funds by name from a displayed list for addition to the control group. Control is then returned to box 122.

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      At Box 123, if the user wants to delete funds, control passes to box 125. If the user wants to delete all funds from the control group, control passes to box 127. The user is then enabled to operate a Run FundClear button that is  
15   displayed with the control group of funds. Box 127 respond by deleting all funds from the control group. Control then returns to box 122.

      If the decision at box 125 is no, control passes to  
20   decision box 126 for a user decision to delete a single fund. If yes, the user selects the fund on the displayed list and operates a delete fund button also displayed with the control group list. This acts to delete the selected fund and return control to box 122. Control continues to  
25   circulate in the loop formed by boxes 122 through 126 until the current control group is okay at box 122. When this happens, control is passed to the Fund Compare box 130 (FIGS. 21 and 23).

30       The FundCompare box serves to compare the filtered funds with the funds of the control group in detail or in summary fashion.

      Security search means 42B can be stored in the internal  
35   memory of computer 41. Alternatively, security search means 42B can be a memory media, such as a memory disc or other

storage device that is arranged to control computer 41, display device 47 and computer input devices 48 to search the universe of funds. In this form of the invention, the memory media includes:

5

(a) means for configuring computer system 40 into a filter means for performing filter passes through a security data base;

10

(b) means for controlling the filter means to present on the viewing screen the pluralities of investment parameters and of parameter limiters that are selectable by user operation of computer input devices 48 to form a proposed filter condition;

15

(c) means for controlling the filter means to present on the viewing screen a histogram showing the population of the funds in different frequency of occurrence categories for a proposed filter condition of the  $i^{\text{th}}$  one of said filter passes. The proposed filter condition includes (i) at least one criteria for one or more of said investment parameters selected by user operation of computer input devices 48 and (ii) all filter conditions for previously performed ones of the filter passes;

20

25

30

(d) means for controlling the filter means to execute the proposed or  $i^{\text{th}}$  filter pass in response to a run command generated by user operation of computer input devices 48;

35

(e) means for causing means (b), means (c) and means (d) to repeat until the  $n^{\text{th}}$  filter pass has been performed; and

(f) optional means for combining the n filter passes with PreScreen 100 or other investment category filter.

5        In a preferred embodiment of the memory media invention, investment parameters 53 and parameter limiters 54 are presented in area 51 of the viewing screen and histogram 56 is presented in area 52 of the viewing screen.

10       The present invention having been thus described with particular reference to the preferred forms thereof, it will be obvious that various changes and modifications may be made therein without departing from the spirit and scope of the present invention as defined in the appended claims.

15

## WHAT IS CLAIMED IS:

1. User interactive apparatus for conducting a search of a data base containing data for a universe of financial instruments, said search including the performance of n filter passes of said data for said universe, said apparatus comprising:

a computer system including a processor, a memory, an access means, a viewing screen, a computer input means and a financial instrument search means, said financial instrument search means configuring said processor to operate said memory, said access means and said viewing screen to conduct said search of said data base in response to user operation of said computer input means, wherein prior to an  $i^{\text{th}}$  filter pass, a plurality of filter criteria for said financial instruments are presented on said viewing screen for user selection of at least one of said criteria as a proposed filter condition by operation of said computer input means, where  $i$  is an integer from 1 and  $n$ , and wherein a histogram for said selected proposed filter condition is presented on said viewing screen, said histogram showing the population of said financial instruments in different frequency of occurrence categories for said proposed filter condition as an aid to the user for selecting one or more of said filter criteria for said  $i^{\text{th}}$  filter pass.

2. The apparatus according to claim 1, wherein said filter criteria include a plurality of investment parameters, there being a different histogram for each investment parameter, said investment parameters being selectable by user operation of said computer input means for selecting said histogram for presentation on said viewing screen.

3. The apparatus according to claim 2, wherein said plurality of filter criteria further includes a plurality of parameter limiters that are presented on said viewing screen.
4. The apparatus according to claim 3, wherein said plurality of parameter limiters includes two or more mathematical operators selected from the group that includes equality, inequality, equal to or greater than, equal to or less than, and not equal to.
5. The apparatus according to claim 4 wherein a filter pass run activator is presented on said viewing screen, said filter run activator being user operable to cause said processor, memory and access means to execute said ith filter pass.
6. The apparatus according to claim 5, wherein said financial instrument search means includes an investment category filter for filtering said universe of financial instruments by a set of investment categories.
7. The apparatus according to claim 6 wherein an investment category filter activator is presented on said viewing screen, said investment category filter activator being user operable to select an investment category filter pass.
8. The apparatus according to claim 2 wherein said histogram and said plurality of investment parameters are presented simultaneously on said viewing screen.
9. The apparatus according to claim 3 wherein said histogram and said plurality of investment parameters are presented simultaneously on said viewing screen.

10. The apparatus according to claim 9 wherein said histogram, all of said investment parameters and all of said parameter limiters are simultaneously presented on said viewing screen.

11. The apparatus according to claim 10 wherein said viewing screen includes first and second display areas; and

wherein said investment parameters are presented in said first display area and said histogram is presented in said second display area.

12. The apparatus according to claim 11 wherein said parameter limiters are presented in said first display area.

13. The apparatus according to claim 12, wherein said areas are presented in a split screen format.

14. The apparatus according to claim 13 wherein a filter pass run activator is presented in said first display area, said filter run activator being user operable to cause said processor, memory and access means to execute said ith filter pass.

15. The apparatus according to claim 14, wherein said financial instrument search means includes an investment category filter for filtering said universe of financial instruments by a set of investment categories.

16. The apparatus according to claim 15 wherein an investment category filter activator is displayed on said viewing screen, said investment category filter activator being user actuated by user operation of said computer input means to select an investment category filter pass.



17. A method of searching a universe of financial instruments by performing n filter passes of said universe with a computer system having a processor, a memory, an access means, a viewing screen and a computer input means, each said filter pass having a filter condition, said method comprising:

(a) configuring said processor, said memory said viewing screen and said access means to conduct said search;

(b) presenting on said viewing screen a plurality of investment parameters, at least one of said investment parameters being selectable by user operation of said computer input means as a proposed filter condition;

(c) presenting on said viewing screen a histogram showing the population of said financial instruments in different frequency of occurrence categories for said proposed filter condition of an  $i^{\text{th}}$  one of said filter passes, where i is an integer from 1 to n, said proposed filter condition including (a) at least one investment parameter selected by user operation of said computer input means and (b) all filter conditions for previously performed ones of said filter passes;

(d) executing said proposed filter pass in response to a run command generated by user operation of said computer input means; and

(e) repeating the foregoing operations (b), (c) and (d) until the  $n^{\text{th}}$  filter pass has been performed.

18. The method according to claim 17 and further including;

presenting on said viewing screen a parameter limiter, said parameter limiter being user selectable to limit a

selected investment parameter in forming said proposed filter condition.

19. The method according to claim 18 wherein said parameter limiter is one of a plurality of parameter limiters, said plurality of parameter limiters being presented on said viewing screen.

20. The method according to claim 19 wherein said plurality of investment parameters and said plurality of parameter limiters are presented in a first area of said screen and said histogram is presented in a second area of said screen.

21. The method according to claim 20 wherein said n filter passes are combined with an additional filter pass that has filter conditions selected from a plurality of investment categories for said financial instruments.

22. A memory media for controlling a computer system to search a universe of financial instruments by performing n filter passes of said universe, said computer system having a viewing screen and a computer input means, each said filter pass employing a filter condition that is selected from a plurality of investment parameters for said financial instruments, said memory media comprising:

(a) means for configuring said computer system as a filter means to perform said filter passes;

(b) means for controlling said filter means by presenting on said viewing screen said plurality investment parameters, said investment parameters being selectable by user operation of said computer input means;

(c) means for controlling said filter means by presenting on said viewing screen a histogram showing the

population of said financial instruments in different frequency of occurrence categories for a proposed filter condition of an  $i^{\text{th}}$  one of said filter passes, where  $i$  is an integer from 1 to  $n$ , said proposed filter condition including (i) at least one investment parameter selected by user operation of said computer input means and (ii) all filter conditions for previously performed ones of said filter passes;

(d) means for controlling said filter means by executing said proposed filter pass in response to a run command generated by user operation of said computer input means; and

(e) means for causing means (b), means (c) and means (d) to repeat until the  $n^{\text{th}}$  filter pass has been performed.

23. A memory media according to claim 22 wherein means is provided to present on said viewing screen a parameter limiter, said parameter limiter being user selectable to limit a selected investment parameter in forming said proposed filter condition.

24. The method according to claim 23 wherein said parameter limiter is one of a plurality of parameter limiters, said plurality of parameter limiters being presented on said viewing screen.

25. The computer media according to claim 24 wherein said means (b) presents said plurality of investment parameters and said plurality of parameter limiters in a first area of said viewing screen and said histogram in a second area of said viewing screen.

26. The computer media according to claim 25 wherein said  $n$  filter passes are combined with an additional filter pass

that has a filter condition selected from a plurality of investment categories for said financial instruments.

27. User interactive apparatus for conducting a search of a data base containing data for a universe of financial instruments, said search including the performance of a filter pass of said data for said universe, said apparatus comprising:

a computer system including a processor, a memory, an access means, a viewing screen, a computer input means and a financial instrument search means, said financial instrument search means configuring said processor to operate said memory, said access means and said viewing screen to conduct said search of said data base in response to user operation of said computer input means, wherein a plurality of investment parameters for said financial instruments is presented on said viewing screen for user selection of at least one of said investment parameters as a proposed filter condition by operation of said computer input means, and wherein a histogram for said selected proposed filter condition is presented on said viewing screen, said histogram showing the population of said financial instruments in different frequency of occurrence categories for said proposed filter condition as an aid to the user for selecting one or more of said investment parameters for said filter pass.

28. The apparatus according to claim 1, wherein there is a different histogram for each investment parameter, said investment parameters being selectable by user operation of said computer input means for selecting said histogram for presentation on said viewing screen.

29. The apparatus according to claim 28, wherein a plurality of parameter limiters is presented on said viewing

screen, said parameter limiters being selectable by user operation of said computer input means for selecting one of said parameter limiters to limit a selected investment parameter for said proposed filter condition.

30. The apparatus according to claim 29, wherein said plurality of parameter limiters includes two or more mathematical operators selected from the group that includes equality, inequality, equal to or greater than, equal to or less than, and not equal to.

31. The apparatus according to claim 28 wherein said histogram and said plurality of investment parameters are presented simultaneously on said viewing screen.

32. The apparatus according to claim 31 wherein a first one of said categories for a selected investment parameter is presented as a display element of said histogram;

wherein a number is presented on said viewing screen in association with said display element;

wherein a first limiter activator for a parameter limiter is presented on said viewing screen in association with said number; and

wherein said first limiter activator is user operable to cause said processor, memory and access means to select said parameter limiter and said number, whereby said proposed filter condition is formed by said parameter limiter, said number and said selected investment parameter.

33. The apparatus according to claim 32 wherein said histogram and said selected investment parameter are simultaneously presented on said viewing screen; and

wherein upon user operation of said first actuator, said parameter limiter and said number are presented on said viewing screen in association with said selected investment parameter.

34. The apparatus according to claim 33 wherein said parameter limiter is one of a plurality of parameter limiters, said plurality of parameter limiters being presented on said viewing screen.

35. The apparatus according to claim 34 wherein said viewing screen includes first and second display areas; and

wherein said investment parameters are presented in said first display area and said histogram is presented in said second display area.

36. The apparatus according to claim 35 wherein said parameter limiters are presented in said first display area.

37. The apparatus according to claim 36, wherein said areas are presented in a split screen format.

**ABSTRACT OF DISCLOSURE**

5 A user interactive apparatus for searching a universe  
of financial instruments such as stocks, bonds, funds and  
the like. The search is conducted with a filtering process  
that involves performing n filter passes of the universe  
with a computer system having a viewing screen, input means  
and an investment selection program. The filter condition  
10 for each filter is from a plurality of parameter limiters  
and a plurality of investment parameters. The pluralities  
of criteria and of parameters are presented in one area of  
the viewing screen. The program enables a user to select  
the filter condition for the  $i^{\text{th}}$  filter pass from the  
15 displayed criteria and parameters by operation of the input  
means. A histogram is then displayed in a second area of  
the viewing screen as an aid to the user in making filter  
condition selections. The histogram shows the population of  
financial instruments in different frequency of occurrence  
20 categories for the user selections. The  $i^{\text{th}}$  filter pass is  
execute d upon a command provided in response to user  
operation of the input means. The process is repeated until  
the  $n^{\text{th}}$  filter pass has been performed.

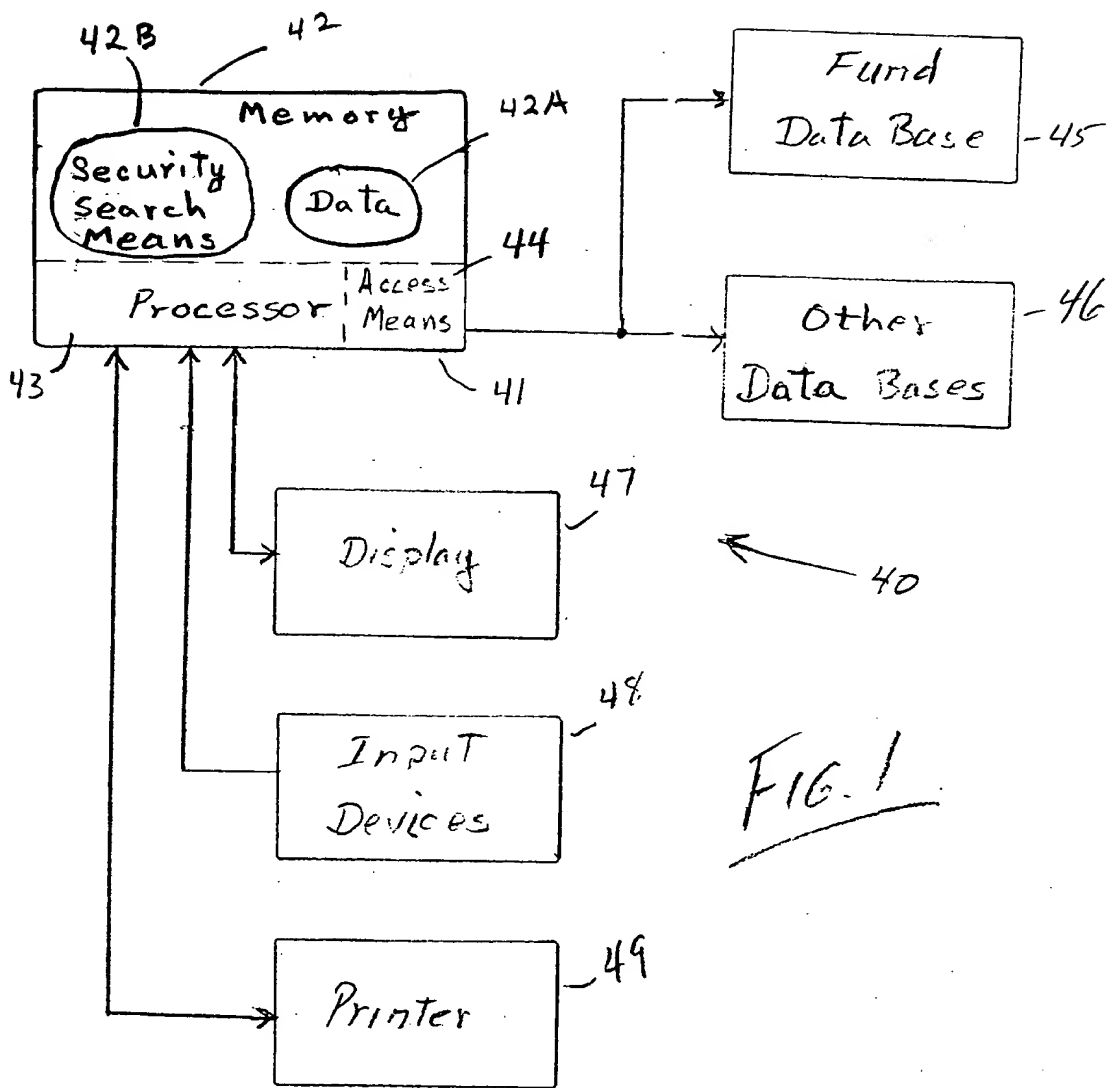


FIG. 1



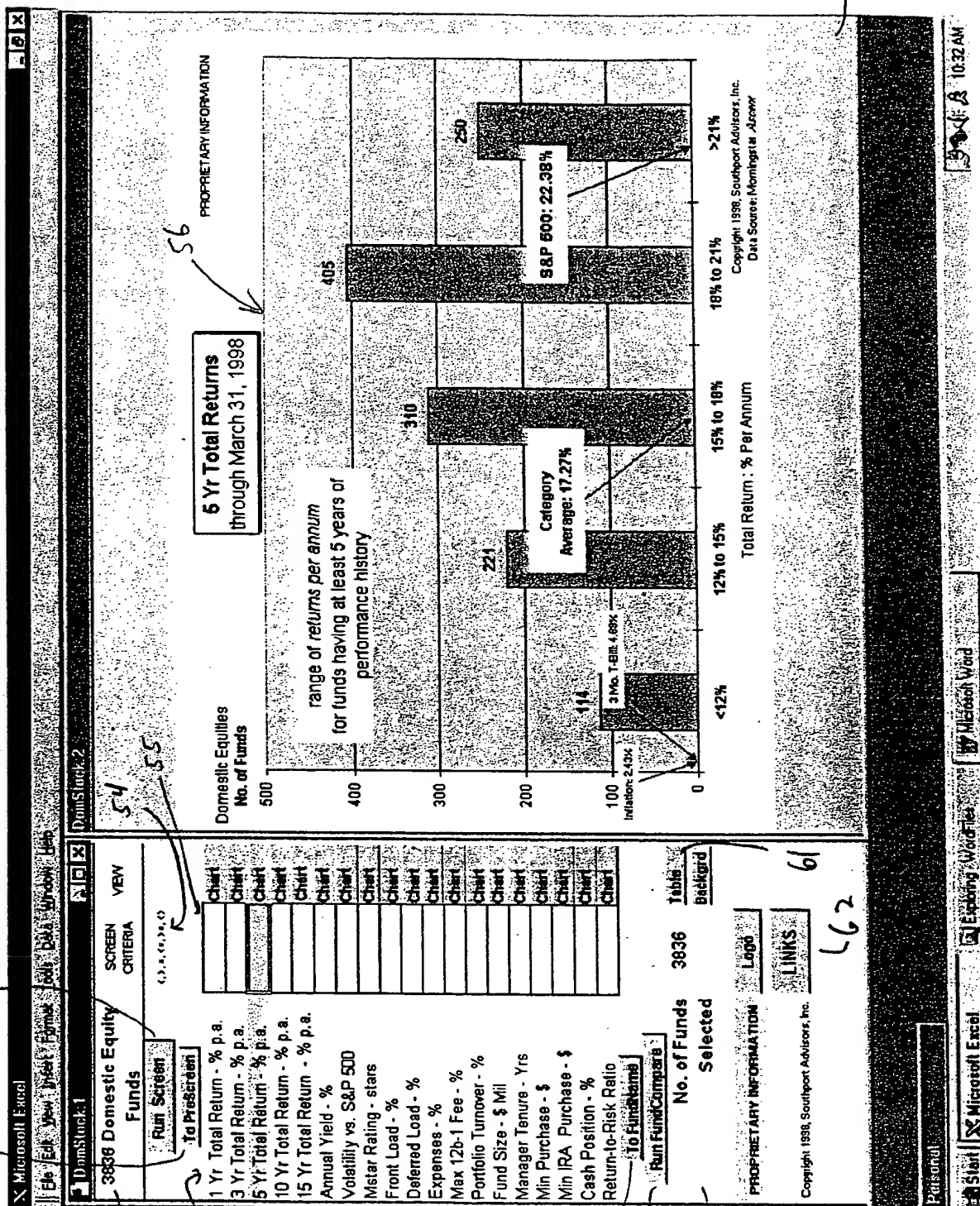


Fig. 2

Microsoft Excel

File Edit View Insert Format Tools Data Window Help

DomStock1

3838 Domestic Equity

SCREEN VIEW

CRITERIA

6, 7, 8, 9, 10, 11, 12

Run Screen

To PreScreen

1 Yr Total Return - % p.a.

3 Yr Total Return - % p.a.

5 Yr Total Return - % p.a.

10 Yr Total Return - % p.a.

15 Yr Total Return - % p.a.

Annual Yield - %

Volatility vs. S&P 500

Mstar Rating - stars

Front Load - %

Deferred Load - %

Expenses - %

Max 12b-1 Fee - %

Portfolio Turnover - %

Fund Size - \$ Mil

Manager Tenure - Yrs

Min Purchase - \$

Min IRA Purchase - \$

Cash Position - %

Return-to-Risk Ratio

To FundName

Run FundCompare

No. of Funds Selected

1387

Table

Background

65

PROPRIETARY INFORMATION

Logo

LINKS

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DomStock22

DOMESTIC EQUITIES - PRESCREEN OPTIONS

Fund Families

Victory Group 10

Select

68

67

69

Activate

Searches normally begin from the entire population of domestic equity funds.

Users may, however, PreScreen this group and limit searches to particular fund categories, to a single fund family, or both.

Use the check and list boxes on the left and above to select desired investment categories and/or a fund family. Then click the "Activate" button to bring up these subgroups only.

When this option is in force the "To PreScreen" button on the main control panel will be backlit.

To remove PreScreen choices and restore the whole domestic equity group, click the "DeActivate" button below.

DeActivate

66

Fund Category

No. of Funds

Aggressive Growth

132

Asset Allocation

237

Balanced

377

Equity-Income

190

Growth

1,255

Growth and Income

832

Small Company

562

Specialty--Misc

27

Specialty--Comm

23

Specialty--Financial

40

Specialty--Health

38

Specialty--Nat Res

58

Specialty--Prec Metals

40

Specialty--Real Estate

73

Specialty--Technology

57

Specialty--Utilities

97

Select

64

DomStock

Microsoft Excel

Exporting Word Files

Microsoft Word

4:35 PM

FIG-3

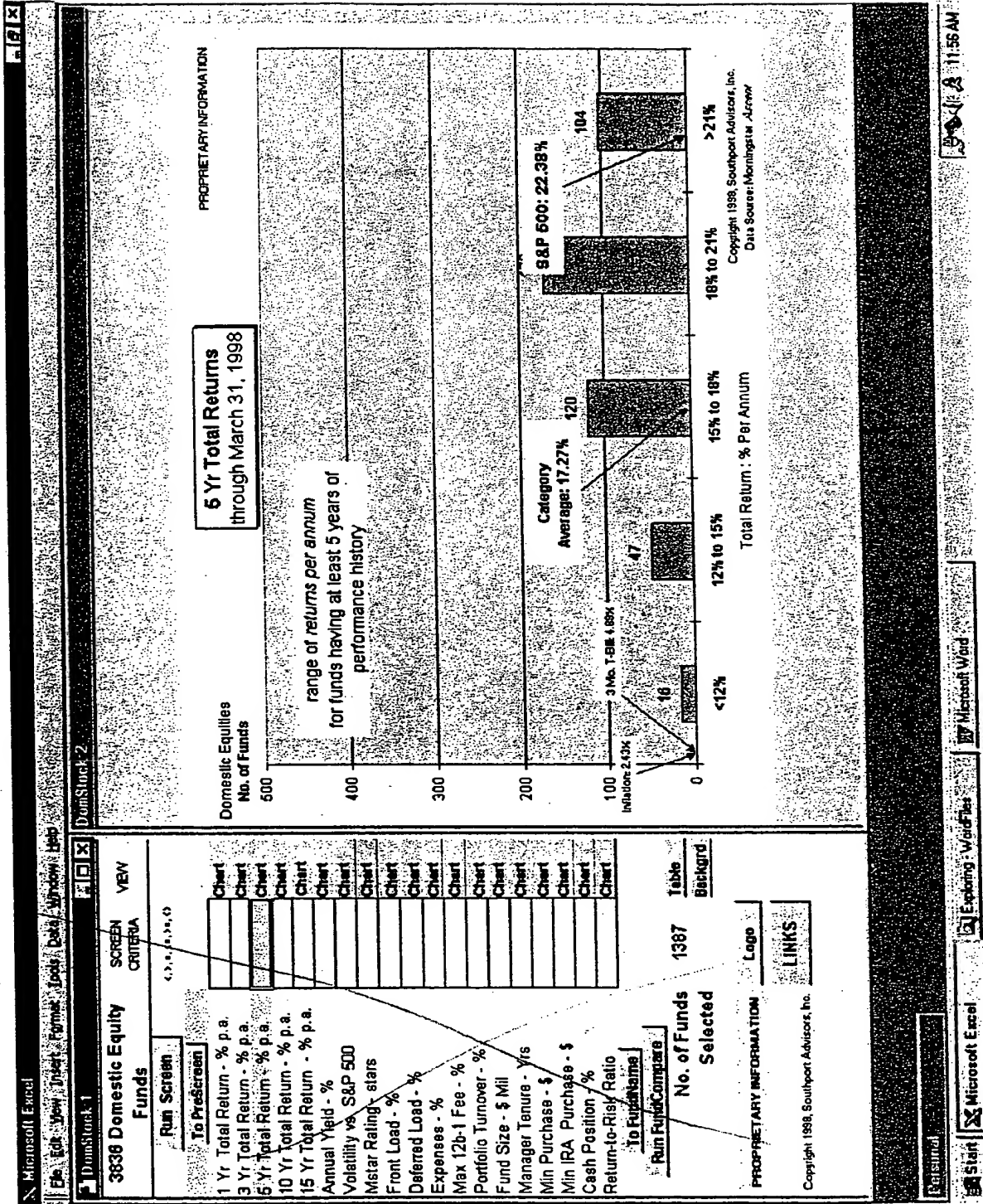


FIG-4

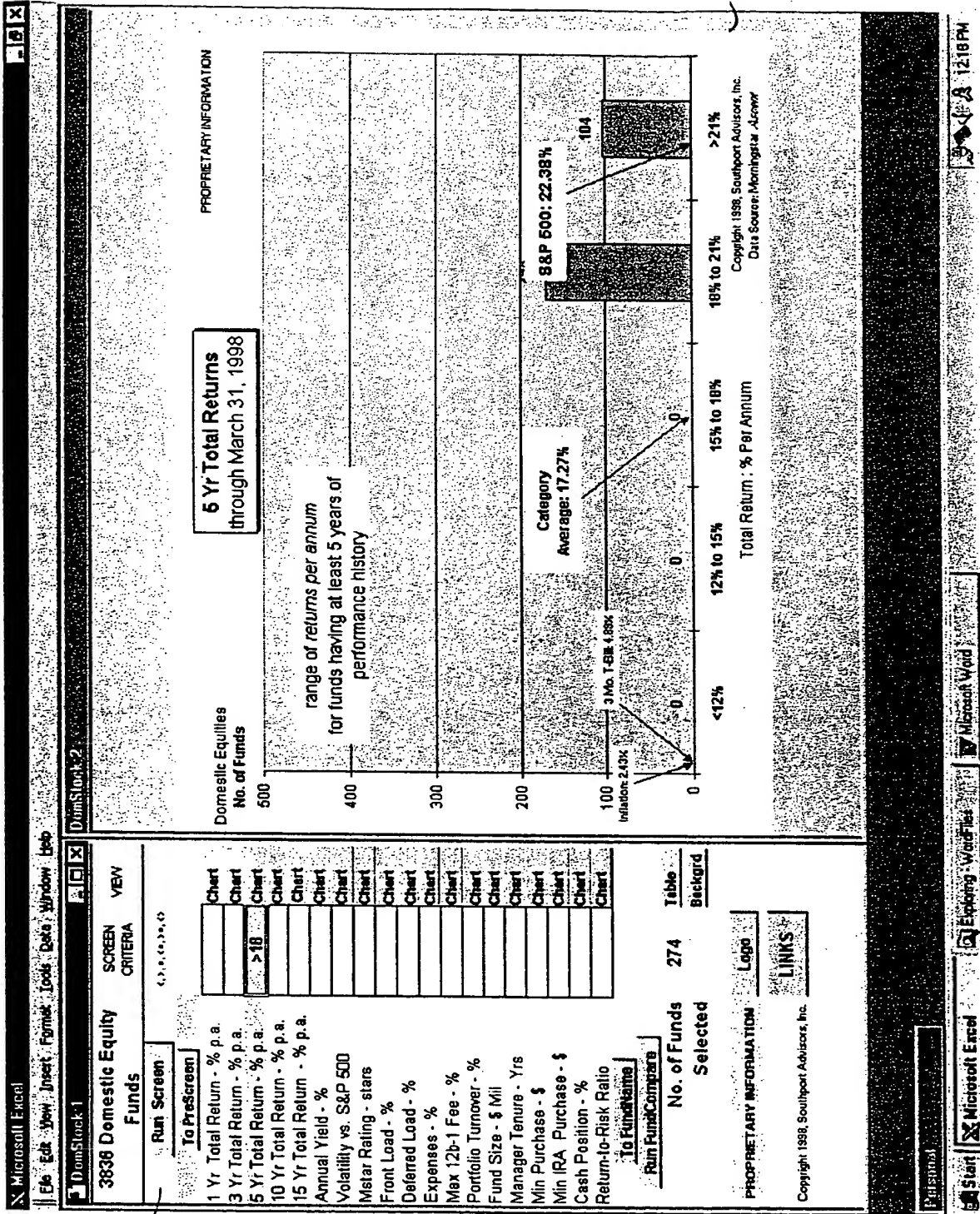


Fig. 5





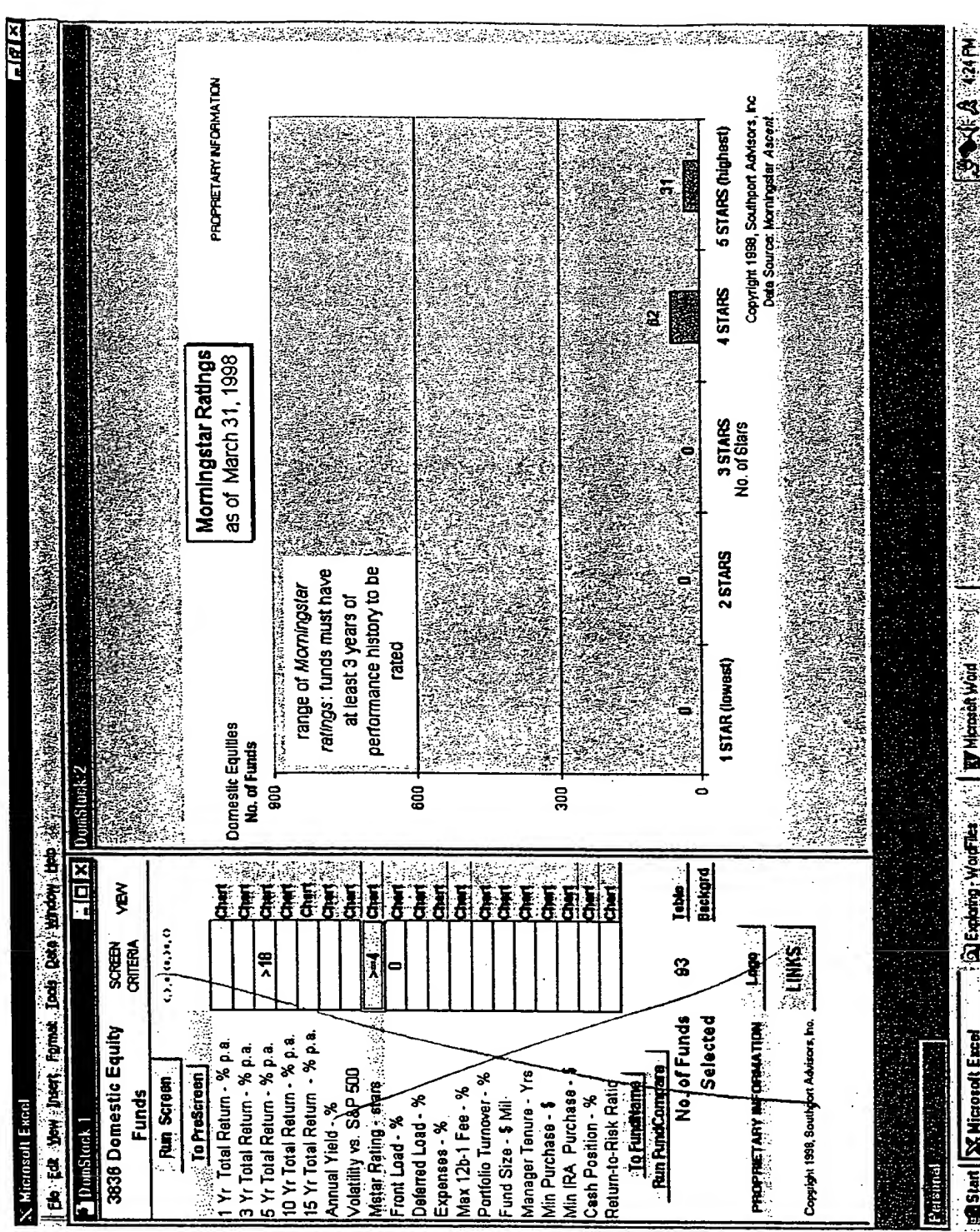
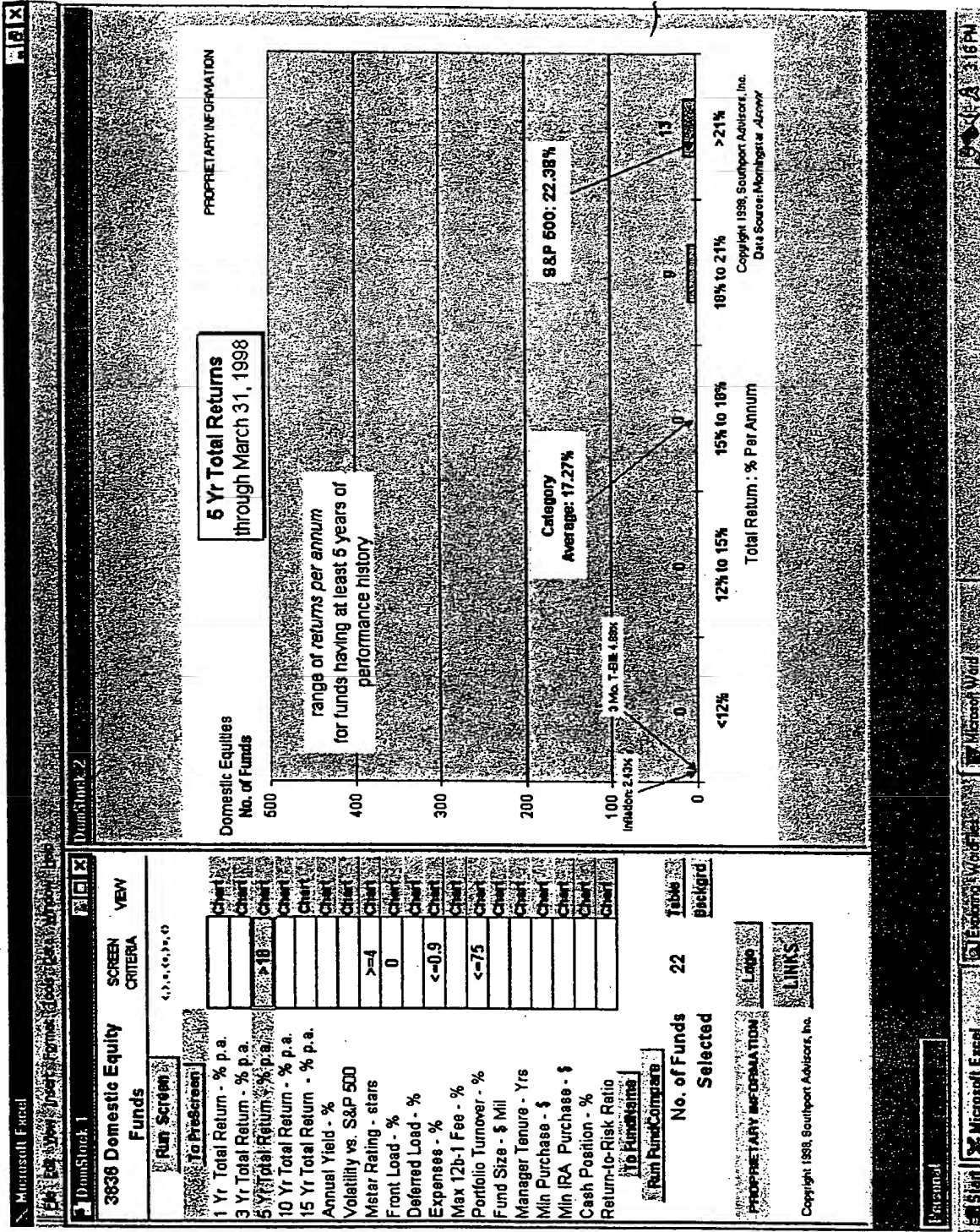


Fig. 7



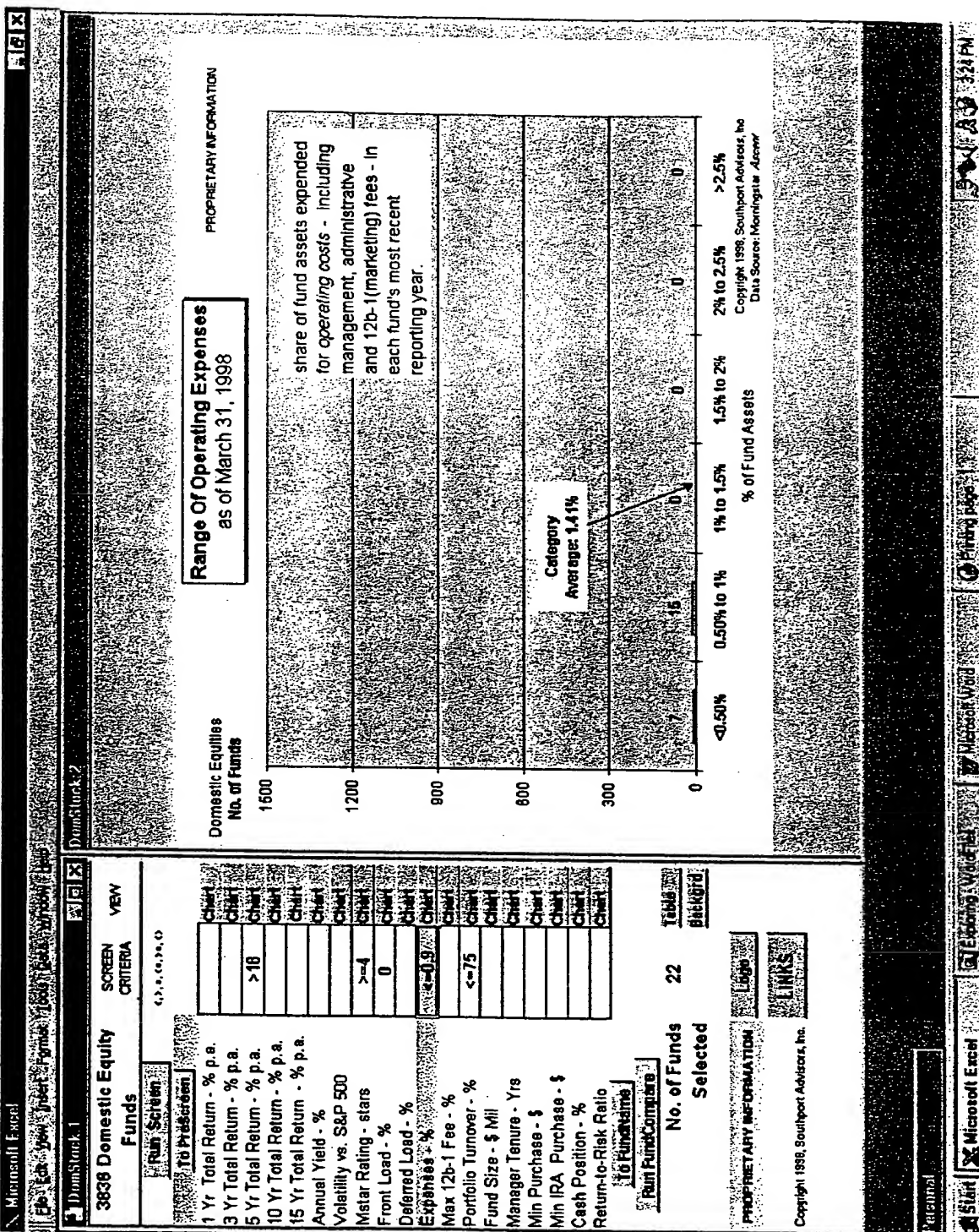


F-16.9









F16.12

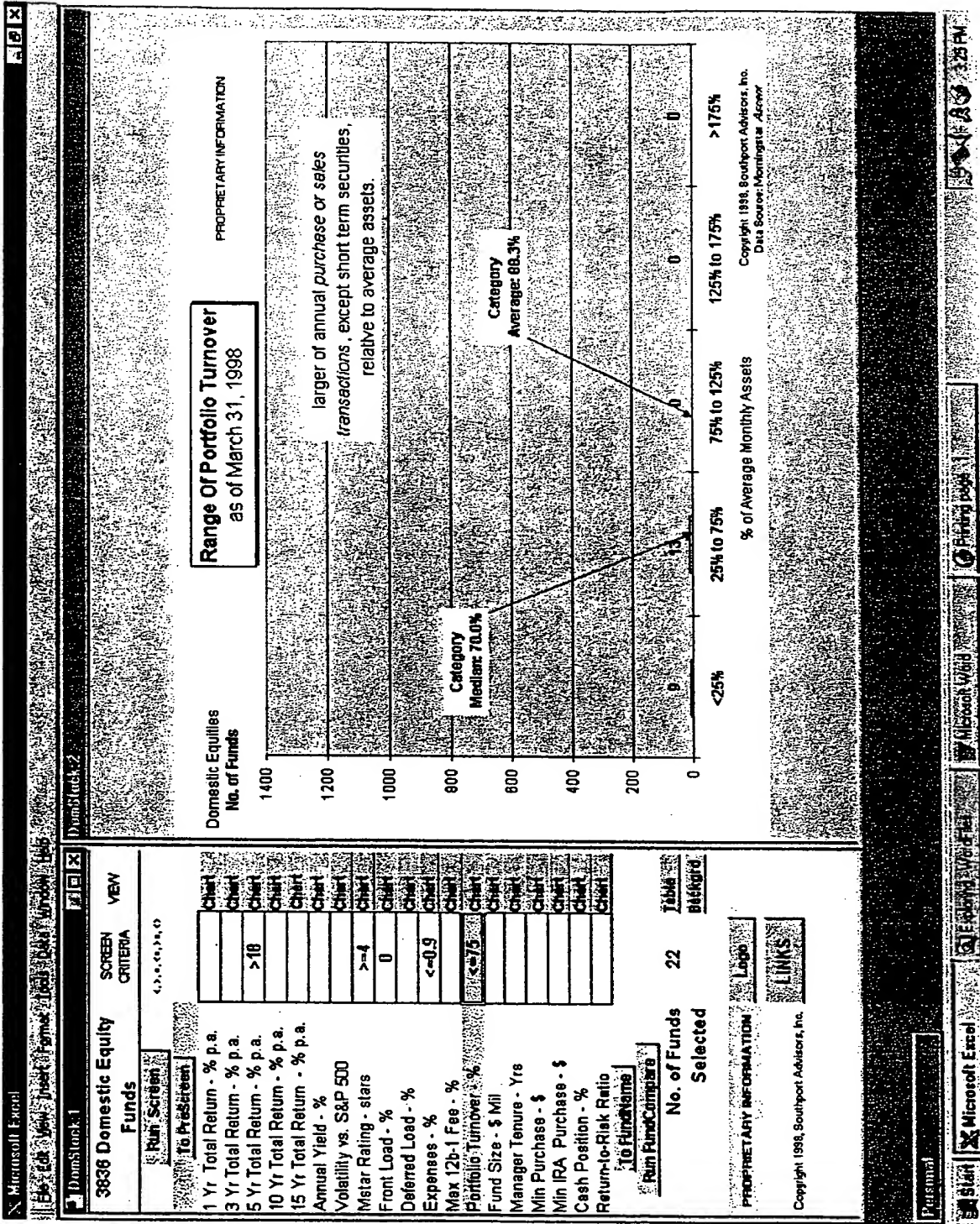


FIG. 13



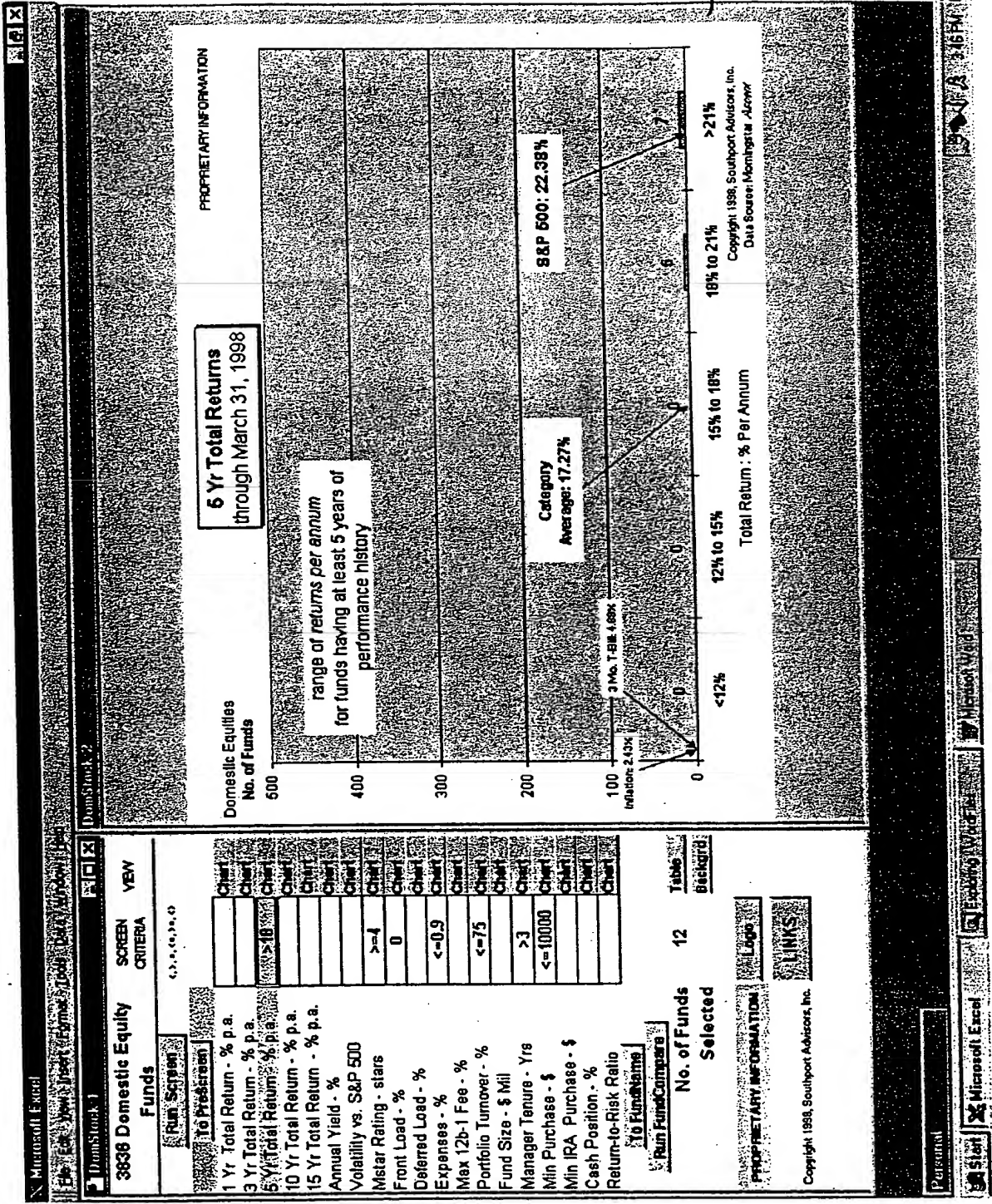


Fig. 14

52

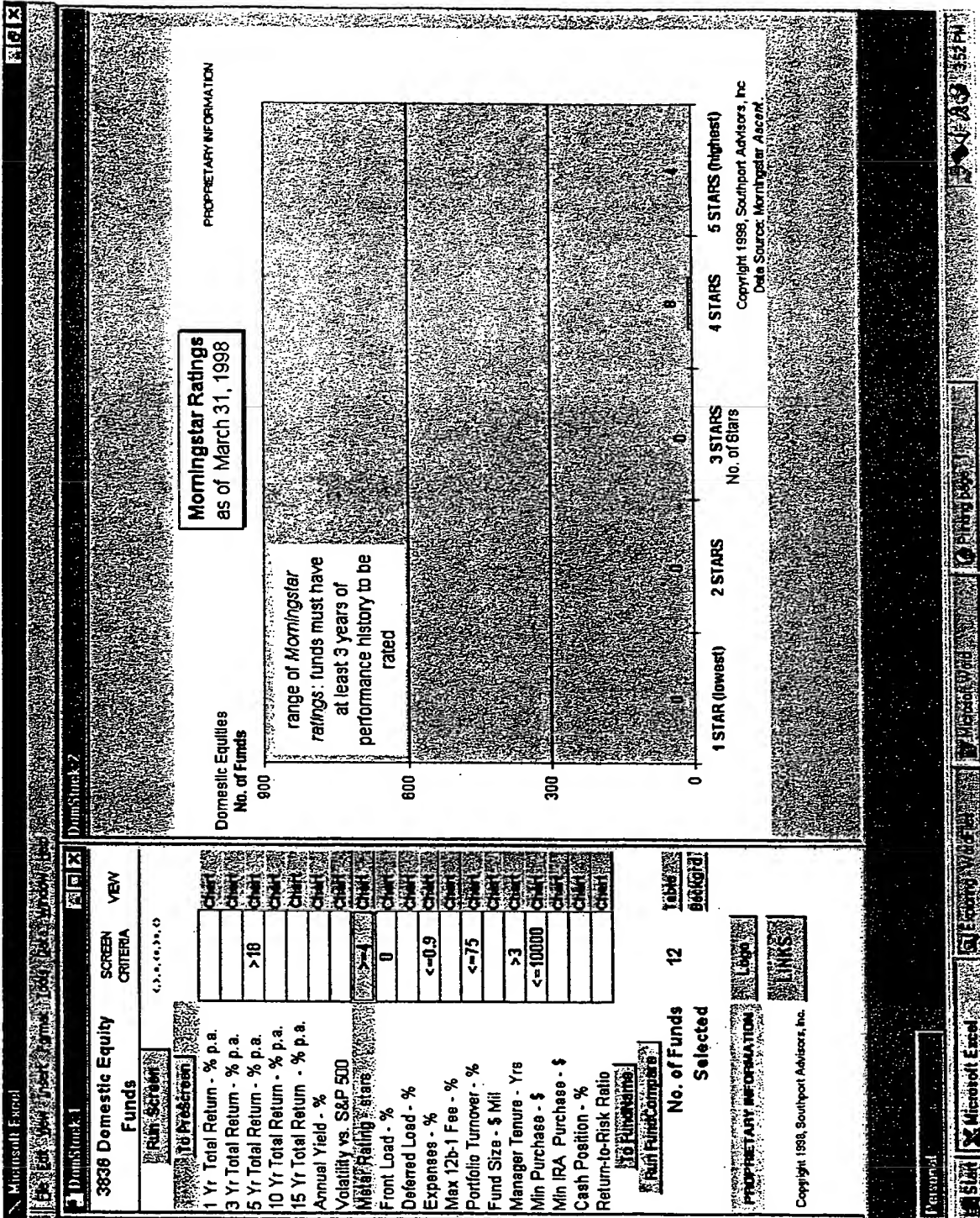
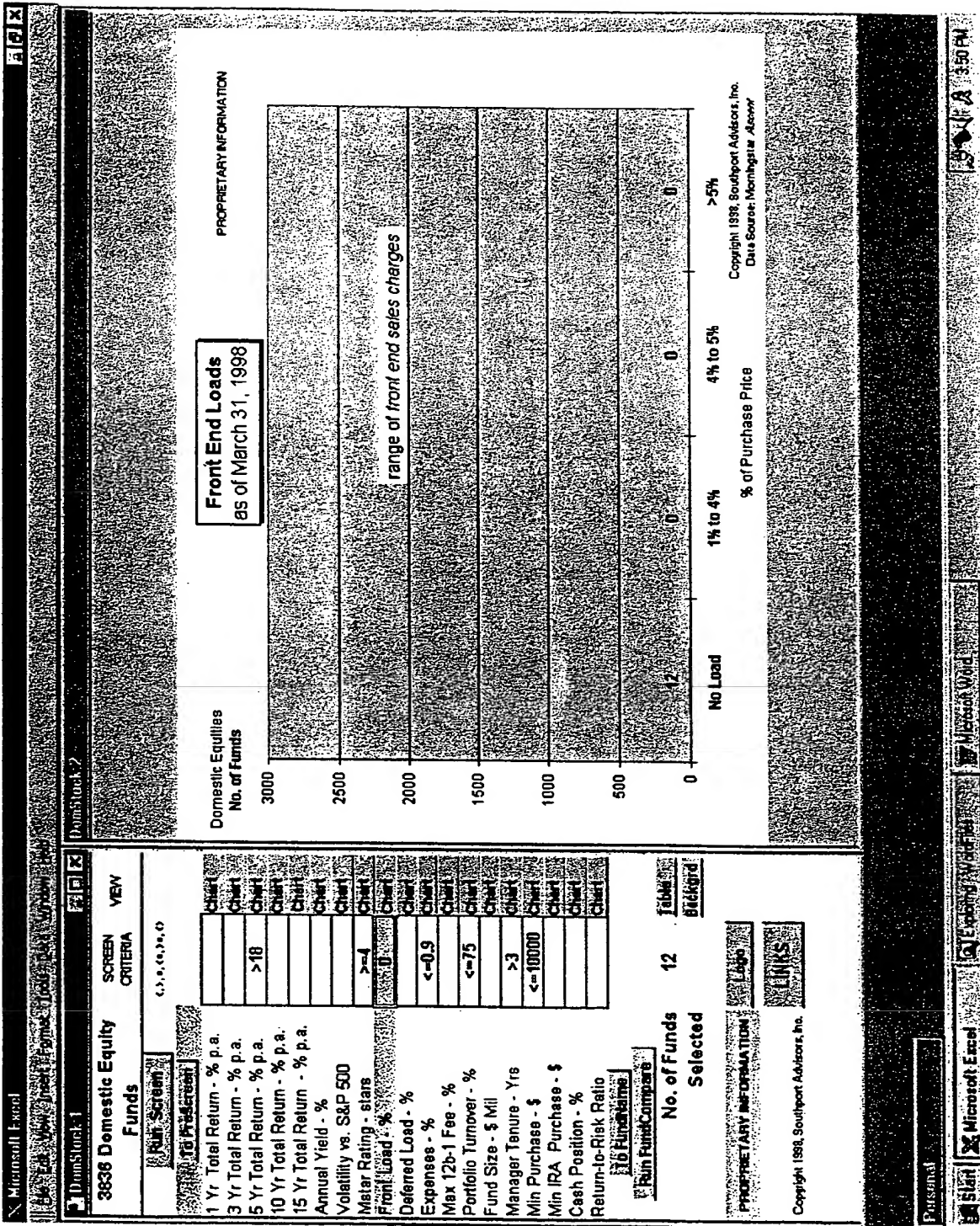
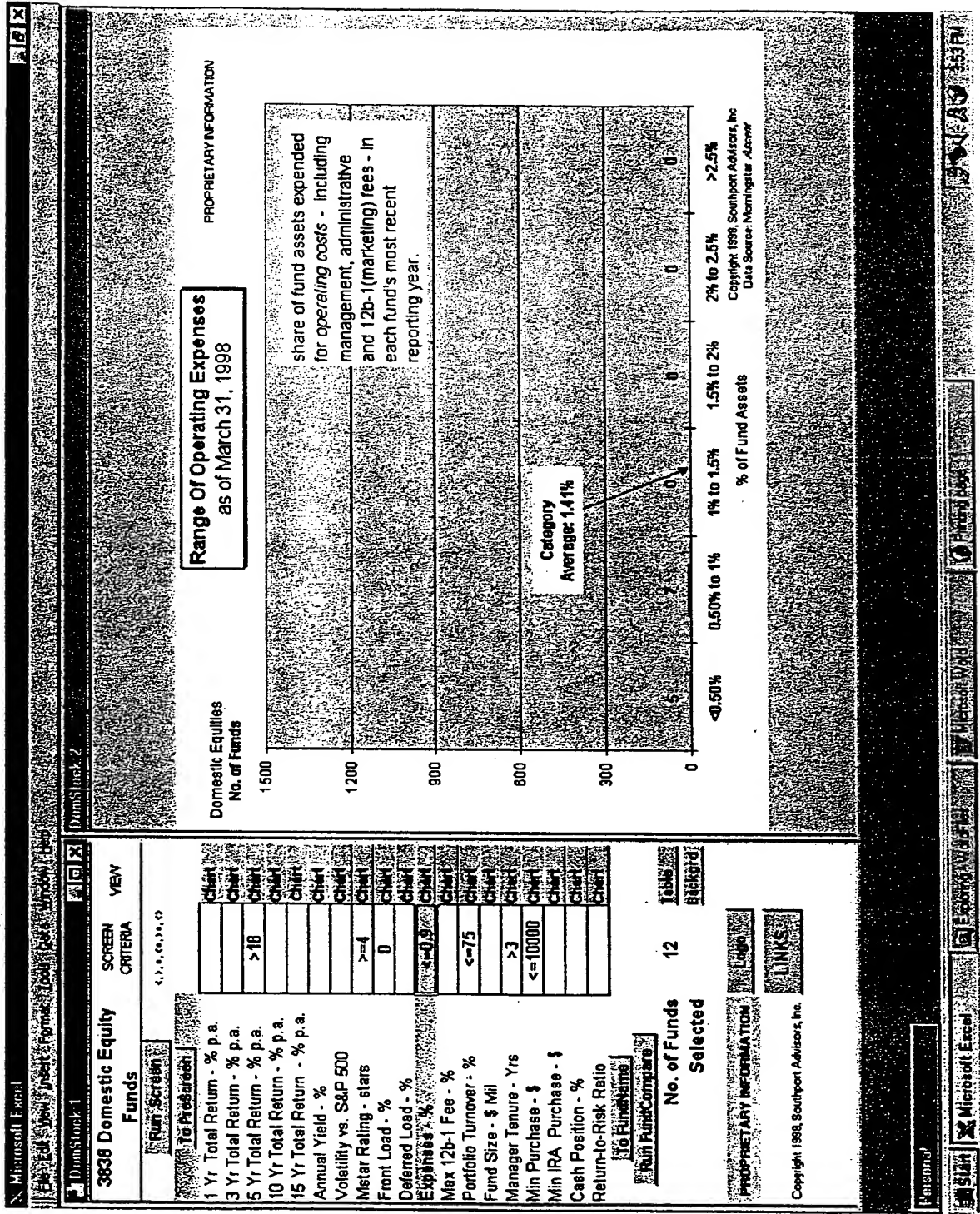


FIG. 15





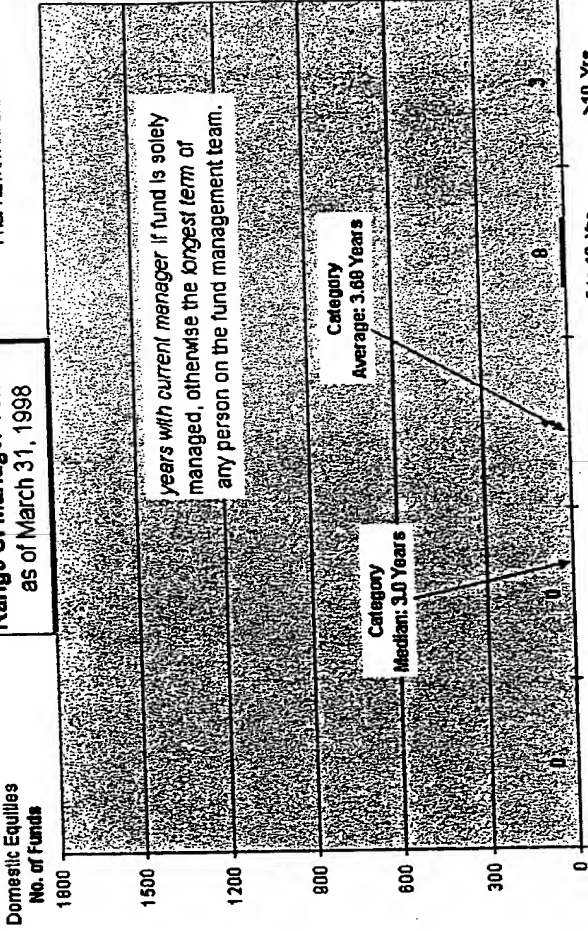
F16.17





Range Of Manager Tenure  
as of March 31, 1998

PROPRIETARY INFORMATION



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Data Source: Morningstar Advisor

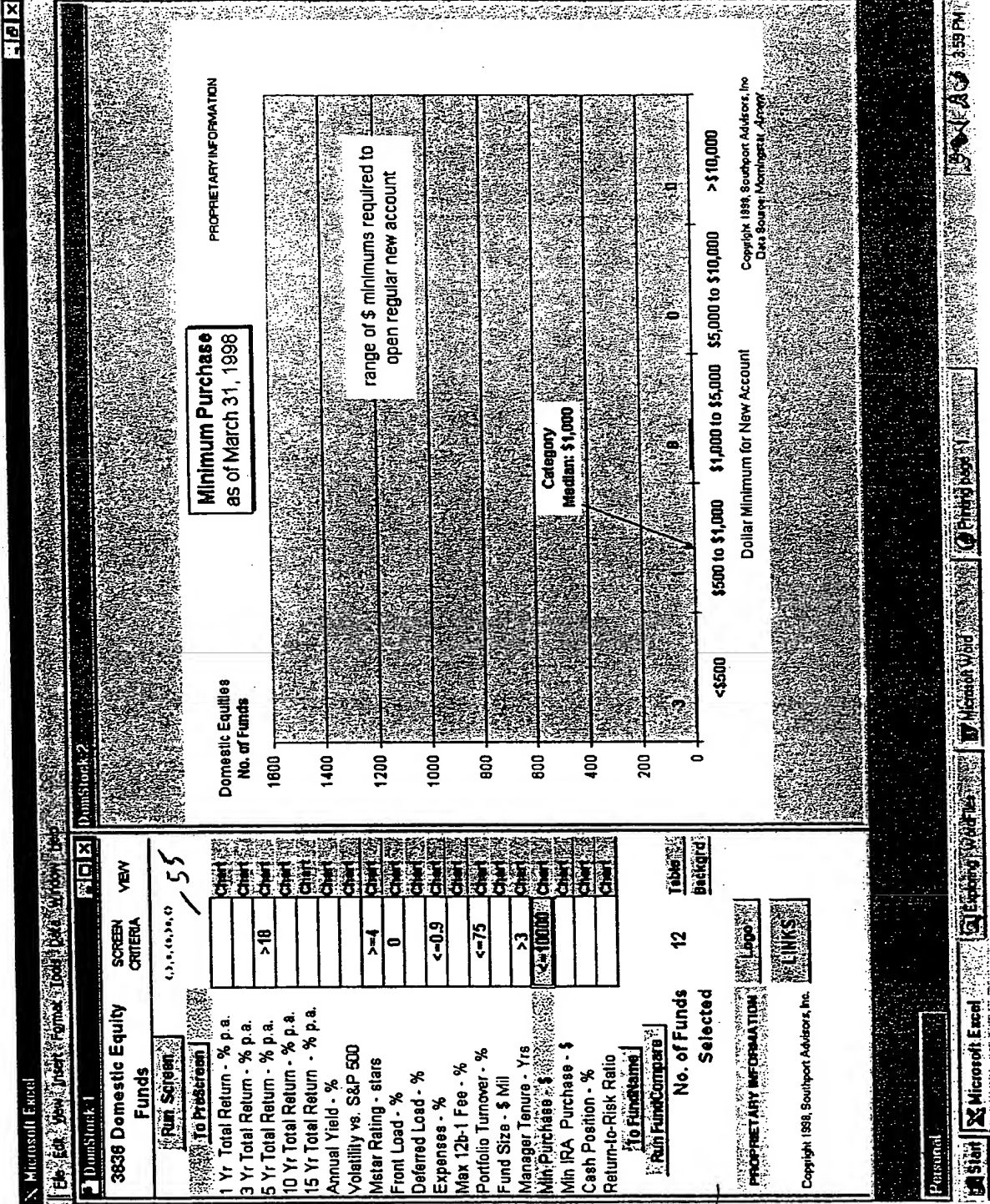
Funds	SCREEN	VIEW
Domestic Equity Funds	Criteria	
1 Yr Total Return - % p.a.	Chart	
3 Yr Total Return - % p.a.	Chart	
5 Yr Total Return - % p.a.	Chart	
10 Yr Total Return - % p.a.	Chart	
15 Yr Total Return - % p.a.	Chart	
Annual Yield - %	Chart	
Volatility vs. S&P 500	Chart	
Metric Rating - stars	Chart	
Front Load - %	Chart	
Deferred Load - %	Chart	
Expenses - %	Chart	
Max 12b-1 Fee - %	Chart	
Portfolio Turnover - %	Chart	
Fund Size - \$ Mil	Chart	
Manager Tenure - Yrs	Chart	
Min Purchase - \$	Chart	
Min IRA Purchase - \$	Chart	
Cash Position - %	Chart	
Return-to-Risk Ratio	Chart	

No. of Funds	Selected
12	Table
	Backgrd

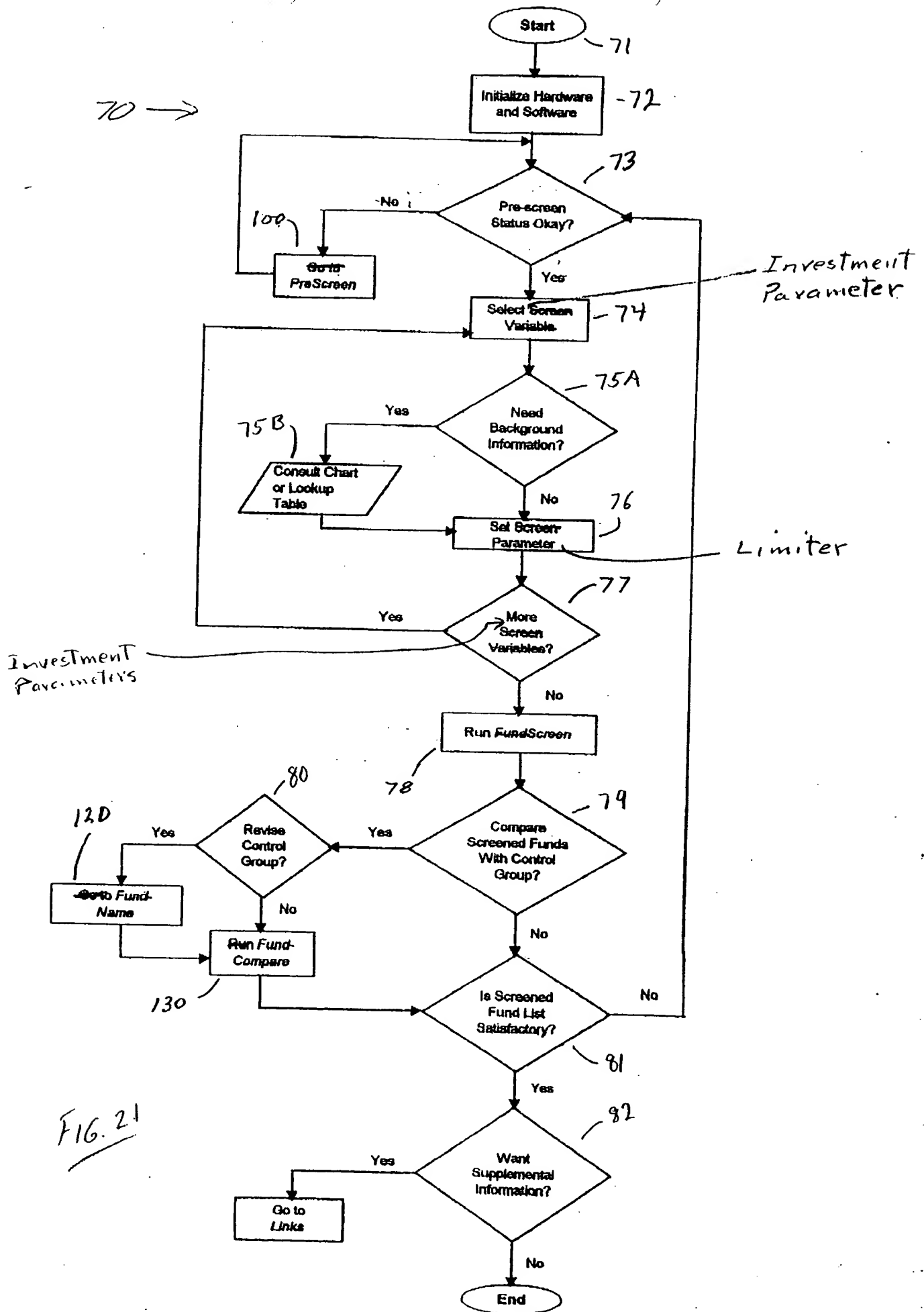
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Fig. 19



716.20



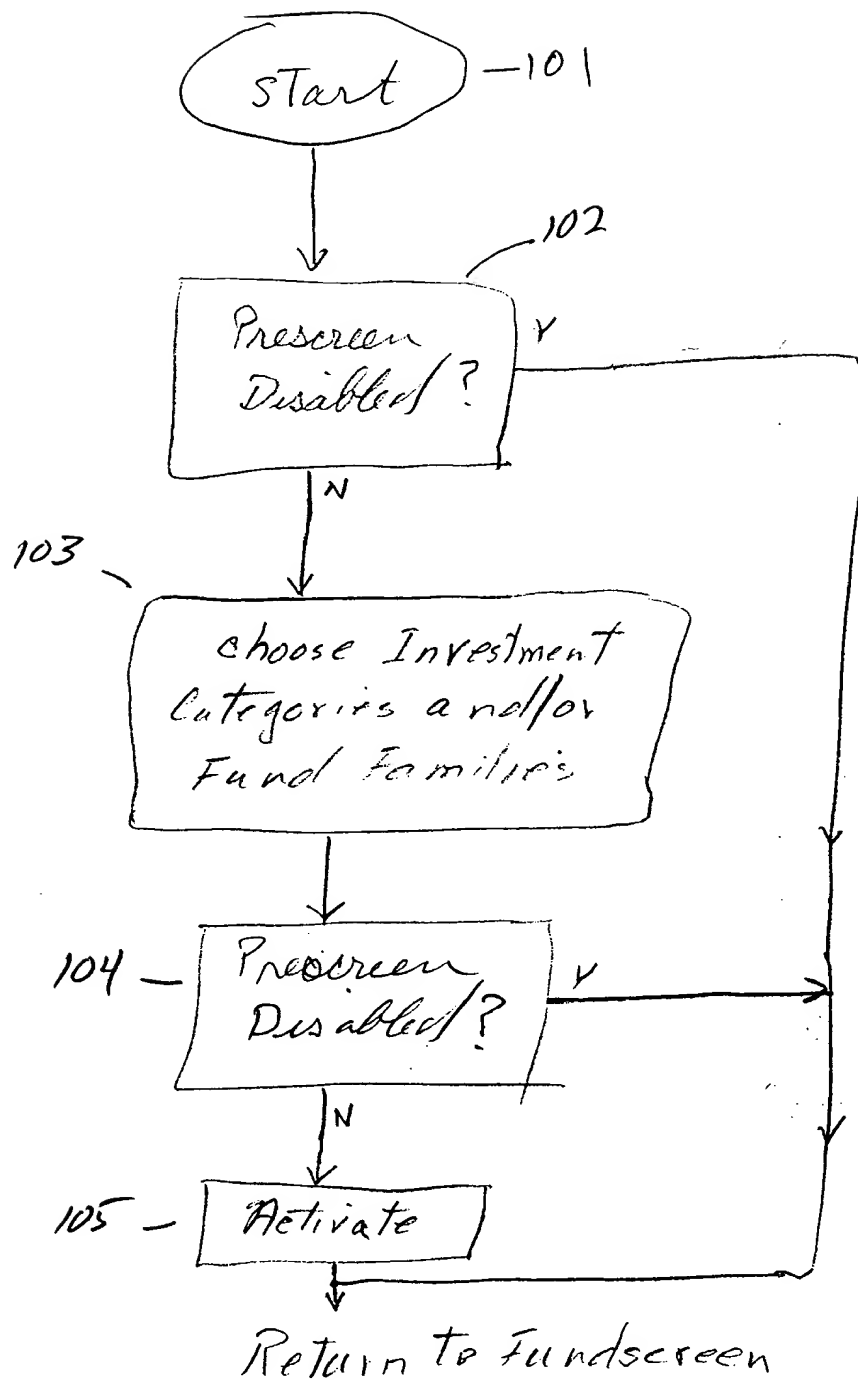


FIG. 22

120

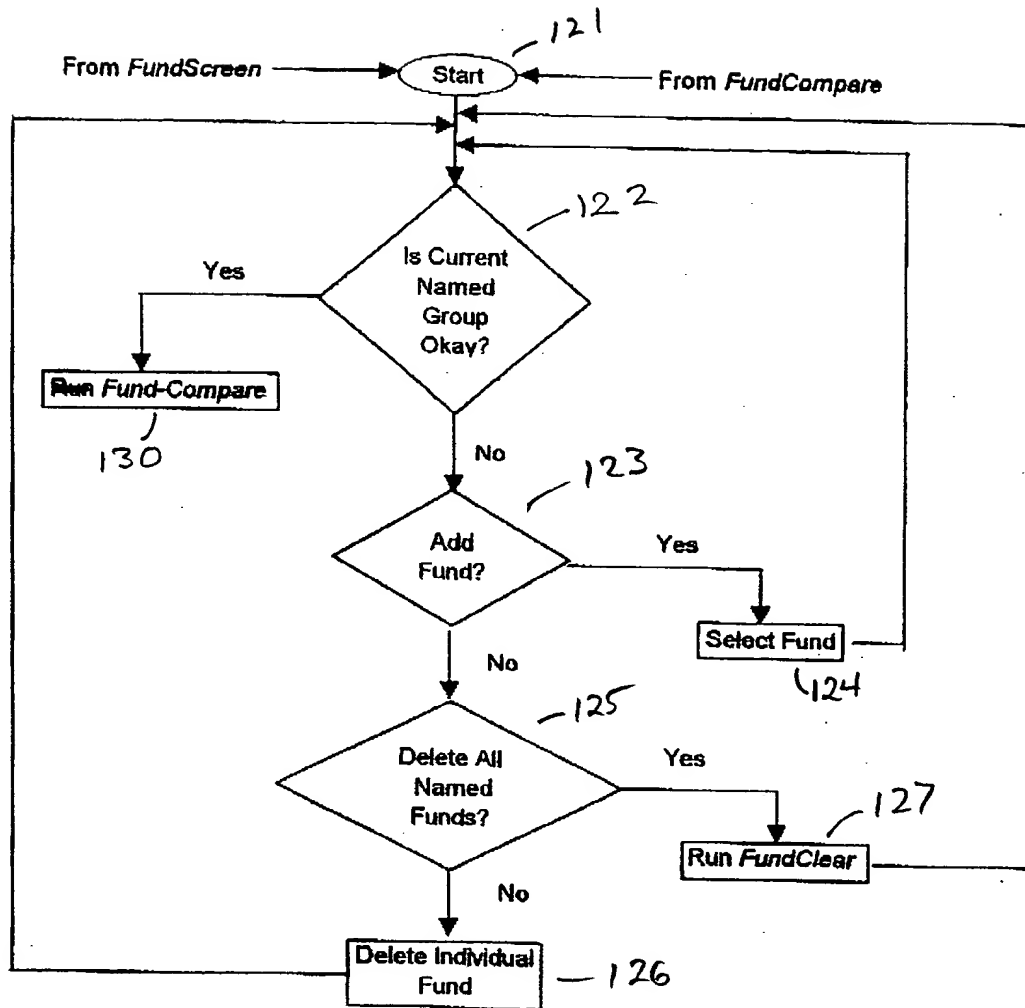


FIG. 23

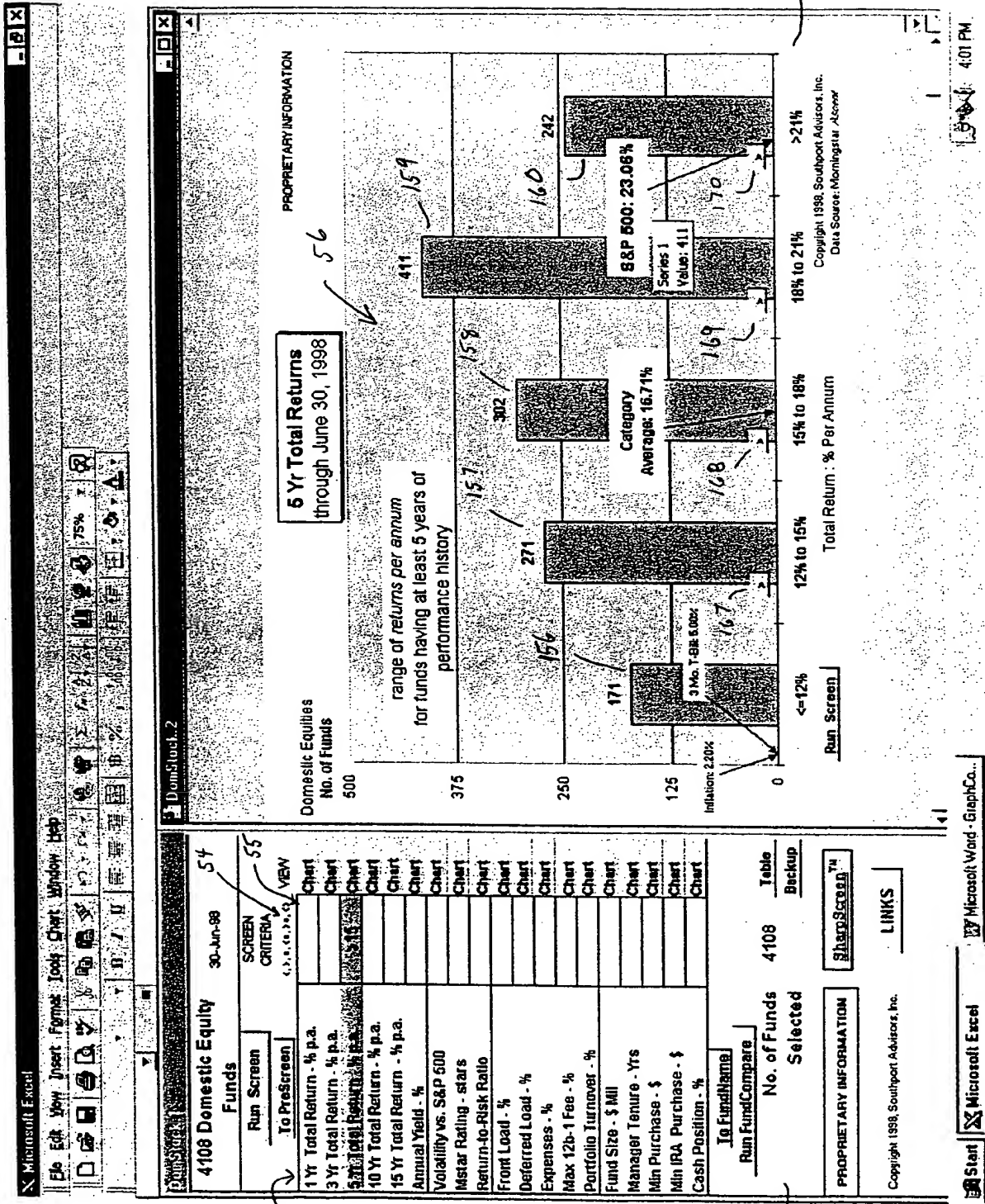


Fig. 24



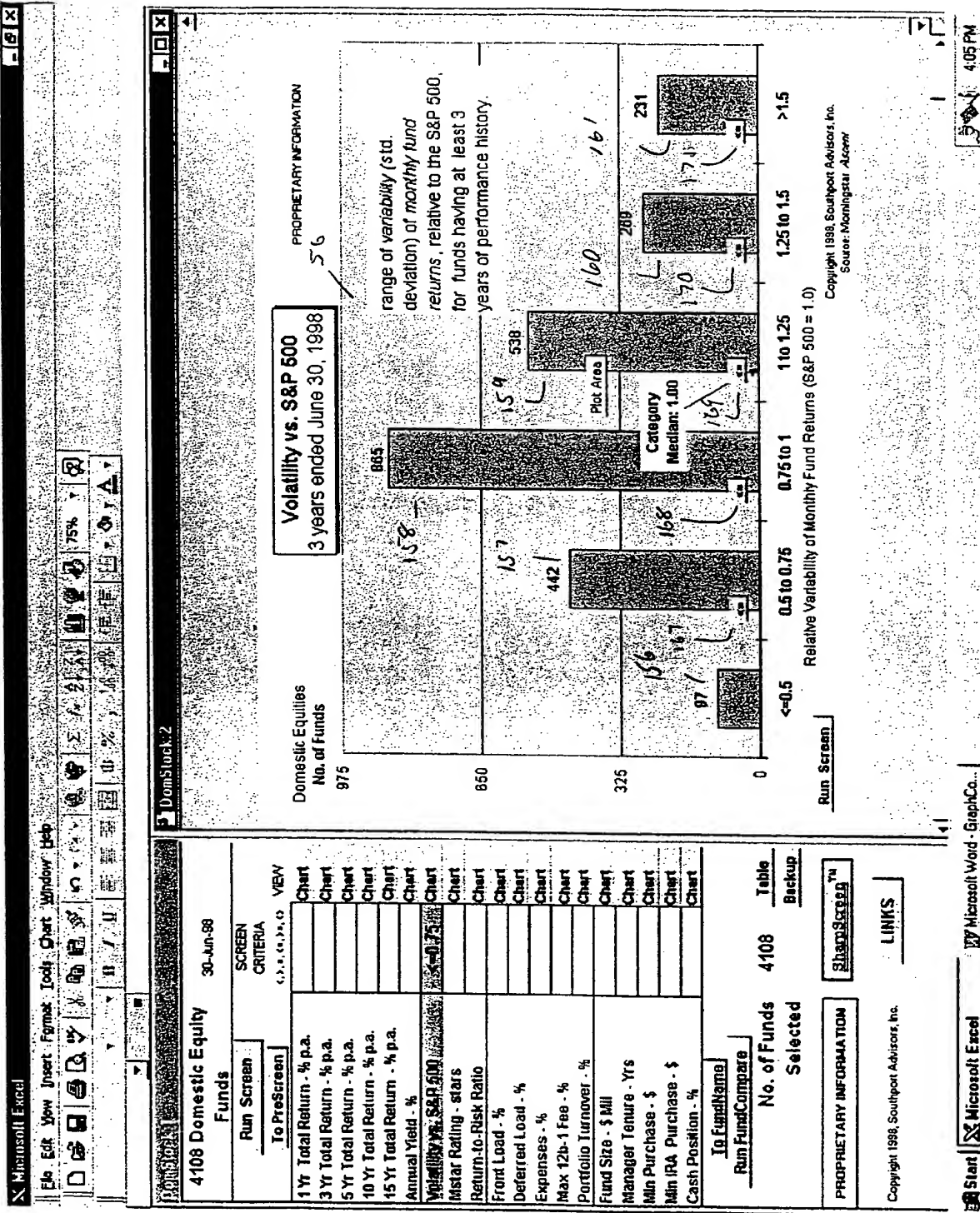


Fig. 25



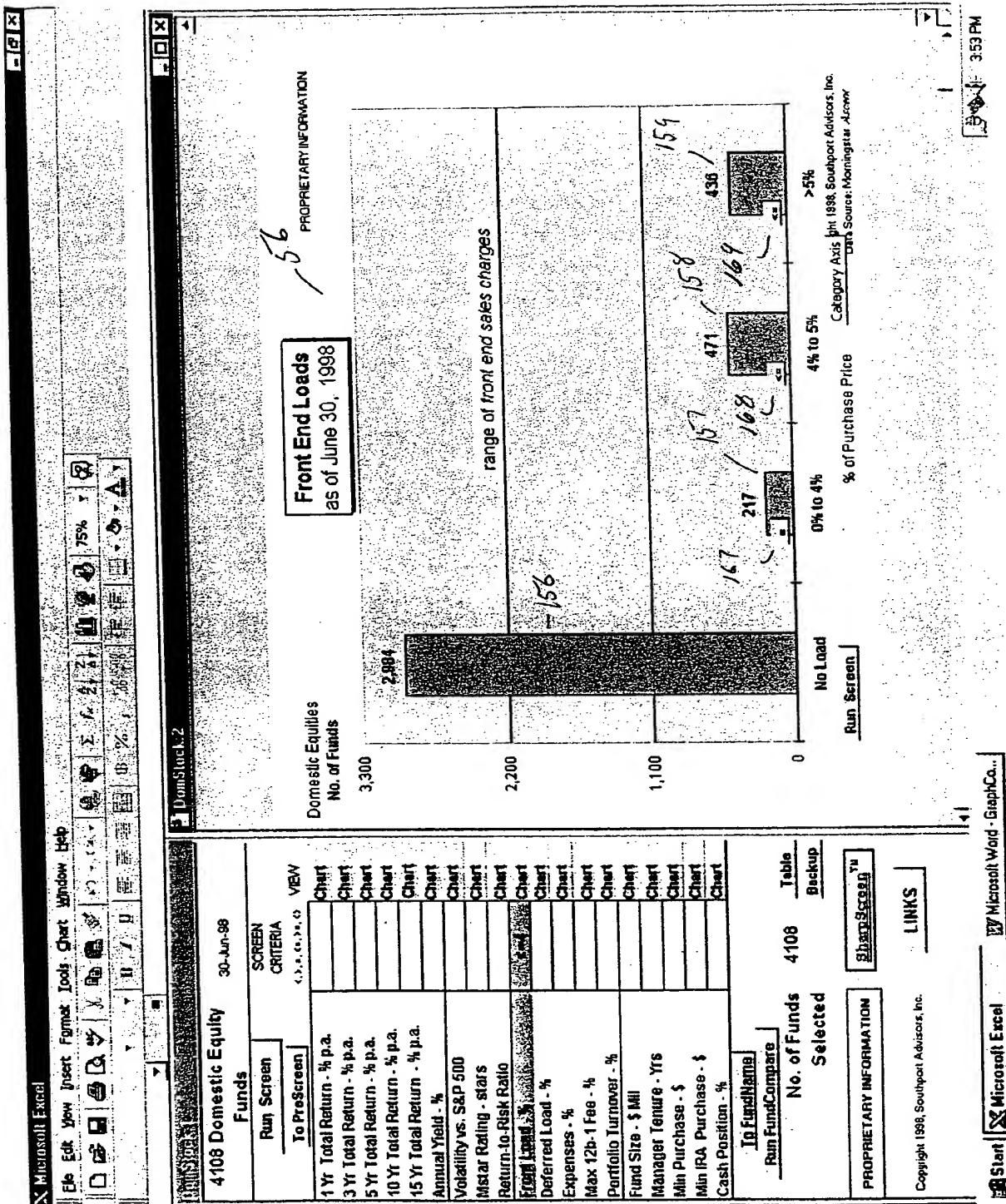


FIG. 26

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